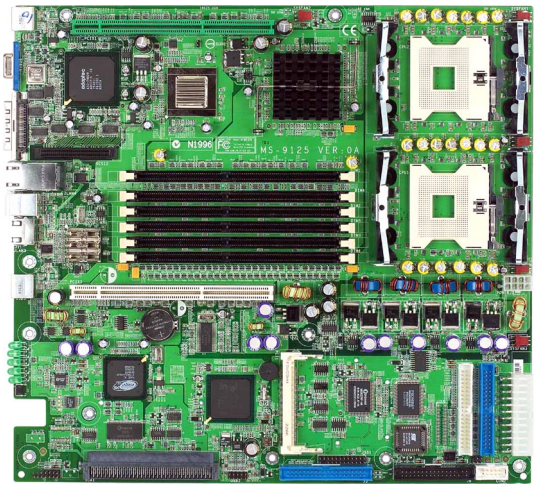
E7501 Master Series

MS-9125 (v1.X) SSI Mainboard



Version 1.0
G52-S9125X1-G22

Manual Rev: 1.0
Release Date: March 2003

CE N1996

FCC-A Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Notice 1
The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2
Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.

Micro-Star International MS-9125

FC **Tested to comply with FCC Standard**

For Home or Office Use

Copyright Notice

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Revision History

Revision	Revision History	Date
V1.0	First release	March 2003

Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

- Visit the MSI website for FAQ, technical guide, BIOS updates, driver updates, and other information: **http://www.msi.com.tw/**
- Contact our technical staff at: **support@msi.com.tw**

Safety Instructions

1. Always read the safety instructions carefully.
2. Keep this User's Manual for future reference.
3. Keep this equipment away from humidity.
4. Lay this equipment on a reliable flat surface before setting it up.
5. The openings on the enclosure are for air convection hence protects the equipment from overheating. **Do not cover the openings.**
6. Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
7. Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
8. Always Unplug the Power Cord before inserting any add-on card or module.
9. All cautions and warnings on the equipment should be noted.
10. Never pour any liquid into the opening that could damage or cause electrical shock.
11. If any of the following situations arises, get the equipment checked by a service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment has not work well or you can not get it work according to User's Manual.
    - The equipment has dropped and damaged.
    - The equipment has obvious sign of breakage.
12. **Do not leave this equipment in an environment unconditioned, storage temperature above 60^0C (140^0F). It may damage the equipment.**

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

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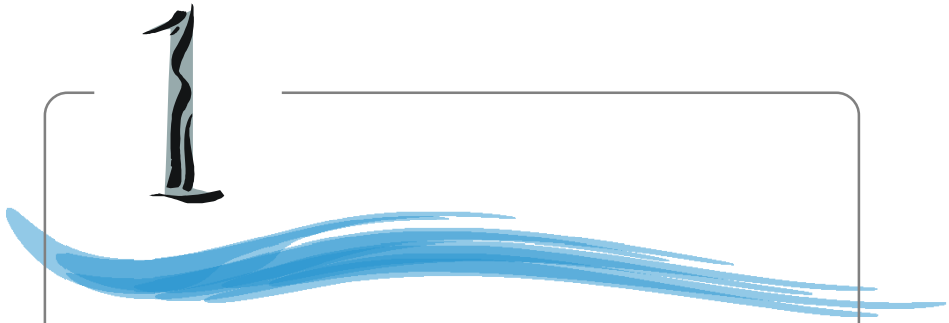


Getting Started

Thank you for purchasing the E7501 Master LRS2 (MS-9125 v1.X) SSI (Server System Infrastructure) mainboard. The E7501 Master LRS2 is a superior computer mainboard based on **Intel® E7500/E7501** & **ICH3-S** chipsets for optimal system efficiency. Designed to fit the advanced Intel® Xeon™ processors in the 604 pin package, the motherboard provides a solution for front-end and general purpose server/workstation in the entry-level and mid-range market segment.

Mainboard Specifications

Target Segment

➤ Target in the entry-level and mid-range, front-end and general purpose server market segments.

CPU

➤ The second-generation of microprocessors using the Intel® NetBurst™ microarchitecture.

➤ Supports Single/Dual Intel® Xeon™ with 512KB L2 cache processors.

Feature	Xeon™ (Prestonia)
L2 Cache	512 KB
L3 Cache	None
Data Bus Transfer Rate	3.2 GB/s or 4.27GB/s
Multi-Processor Support	1-2 CPUs
Manageability Features	Intel and OEM EEPROMS and thermal sensor on package
Package	PGA 604
Operating Voltage	1.475 V

Chipset

➤ Intel® E7500/7501 North Bridge
- Supports dual processors at 100/133MHz (x4 transfers).
- System bus bandwidth of 3.2GB/s or 4.27GB/s.
- 144-bit wide, DDR200/266 memory interface.

➤ Intel® ICH3-S South Bridge
- Universal Host Controller Interface (UHCI) USB 1.1 compliant host controllers.
- 2 channel Ultra ATA/100 bus Master IDE controller.
- SMBus controller.
- I/O APIC.
- AC'97 2.2 interface.
- PCI 2.2 interface.

➤ Intel® P64H2 Chipset
- Supports 64-bit PCI-X slots at 66/100/133MHz..
- Connects directly to the MCH and provides a dedicated path for high performance I/O.

Memory Bus Feature

- Supports dual channel (144-bit wide) DDR200/266 memory interface. Each channel supports 3 DIMM slots.
- Supports six 184-pin DDR DIMM sockets up to 12GB.
- Supports ECC (x72) DDR200/266 DIMMs using 64MB, 128MB, 256MB, or 512MB DRAMs.

I/O Feature

- 266 MB/s point-to-point connection for ICH3-Switch parity protection.
- 8-bit wide, 66 MHz base clock, 4X data transfer.
- 1 GB/s point-to-point connection for I/O bridges with ECC protection. 16-bit wide, 66 MHz base clock, 8X data transfer.
- 2 channel Ultra ATA/100 bus master IDE controller.

Bandwidth Summary

Interface	Clock Speed (MHz)	Samples per Clock	Data Width (Bytes)	Bandwidth (MB/s)
System Bus (Data)	100/133	4	8	3200/4270
DDR interface	100/133	2	16	3200/4270
Hub Interface A	66	4	1	266
Hub Interface B, C, D	66	8	2	1066
PCI-X	66	1	8	528
	100	1	8	800
	133	1	8	1066

Slots

- Two PCI-X (64-bit/100MHz) slots (the green one for Adaptec ZCR).
- One Mini PCI (32-bit/33MHz) slot.

Ultra-320 SCSI Adapter (Optional)

- Integrated Adaptec AIC-7902 Ultra-320 SCSI adapter.
- Supports dual-channel Ultra320 LVD SCSI.
- Supports Adaptec ZCR & Intel RAIDIOS (Zero-Channel RAID).

ATA133 RAID (Optional)

- Integrated Promise 20271 ATA133 RAID controller.
  - Two-channel bus master IDE port.
  - Supports ATA133 RAID 0, 1, and 0+1.

Network

➤ Intel® 82546EB Gigabit Ethernet Controller
- Provides 1000, 100, and 10Mb/s data rates, 64-bit/100MHz PCI-X bus.
- Dual ports.

Power Management Features

➤ Wake up on LAN (WOL), USB, PCI, Mouse.
➤ RTC alarm.
➤ Supports ACPI S1, S4, and S5 functions.

System Management

➤ SMBus (I^2C).
➤ Temperature, voltage and fan monitors.
➤ Thermal protection.
➤ Chassis Intrusion.

Server Management (Optional)

➤ National Semiconductor® PC87431 mBMC (mini-Baseboard Management Controller)
- Incorporates an embedded microcontroller, three System Management Bus (SMBus®) interfaces, a Chassis Management interface, Bi-color LED control, an integrated EEPROM, Fan control, 12 ADC channels, and Digital Input Event and General-Purpose Input/Output pins.
- Interfaces with the host via a slave SMBus interface; it interfaces with the LAN On Motherboard (LOM) and with peripherals via two independent master SMBus interfaces.

BIOS

➤ 4 Mbit Flash EEPROM.
➤ PCI 2.2 compliant, VPD, and DMI.
➤ PnP 1.0A, SMBIOS 2.3, ACPI 2.0.
➤ Supports PXE boot protocol.
➤ APM 1.2, WOL, WOR.
➤ PC2001 system design compliant.

MS-9518 SCSI Add-In Card (Optional)

➤ Adaptec AIC-7892B SCSI controller.
➤ Mini PCI interface.

Dimension

➤ SSI EEB 3.0 Form Factor: 12" x 13" (W x H).

Mounting

➤ 18 mounting holes in total, including CPU fan mounting holes.

MSI Reminds You...

Enabling the functionality of Hyper-Threading Technology for your computer system requires ALL of the following platform Components:

*****CPU***: Intel® Pentium® 4 or Xeon™ Processors with HT Technology;*

*****Chipset***: Intel® Chipsets that support HT Technology;*

*****BIOS***: A BIOS that supports HT Technology and has it enabled;*

*****OS***: An operating system that supports HT Technology.*

For more information on Hyper-threading Technology, go to:

http://www.intel.com/info/hyperthreading

Video

➤ Integrated ATI Rage™ XL graphics controller.

➤ Built-in DVD decoding.

➤ Offer integrated TMDS transmitter support for Digital Flat Panel (DFP) monitors.

➤ Onboard 8MB Video SDRAM.

MSI Reminds You...

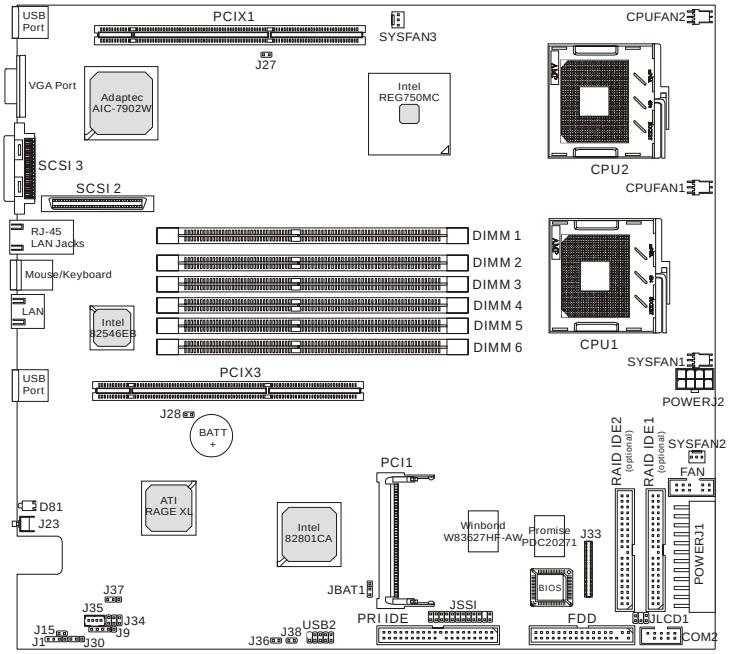
Please refer to Table 1 for 2D modes supported for both CRT and LCD. The table specifies the minimum memory requirement for various display resolutions, refresh rates and color depths.

Table 1. 2D Modes (TFT or CRT)

Mode	Refresh rate(Hz)	Minimum Amount of Memory Required			
		8bpp	16bpp	24bpp	32bpp
640x480	60	2MB	2MB	2MB	2MB
640X480	72	2MB	2MB	2MB	2MB
640X480	75	2MB	2MB	2MB	2MB
640X480	90	2MB	2MB	2MB	2MB
640X480	100	2MB	2MB	2MB	2MB
800X600	60	2MB	2MB	2MB	4MB
800X600	70	2MB	2MB	2MB	4MB
800X600	75	2MB	2MB	2MB	4MB
800X600	90	2MB	2MB	2MB	4MB
800X600	100	2MB	2MB	2MB	4MB
1024X768	60	2MB	2MB	4MB	4MB
1024X768	72	2MB	2MB	4MB	4MB
1024X768	75	2MB	2MB	4MB	4MB
1024X768	90	2MB	2MB	4MB	4MB
1024X768	100	2MB	2MB	4MB	4MB
1280x1024	43	2MB	4MB	4MB	6MB
1280x1024	60	2MB	4MB	4MB	6MB
1280x1024	70	2MB	-	4MB	6MB
1280x1024	72	2MB	-	4MB	6MB
1600x1200	66	4MB	4MB	6MB	8MB
1600x1200	76	4MB	4MB	6MB	-

Shading indicates modes not supported by TFT

Mainboard Layout



E7501 Master LRS2 (MS-9125 v1.X) SSI Mainboard

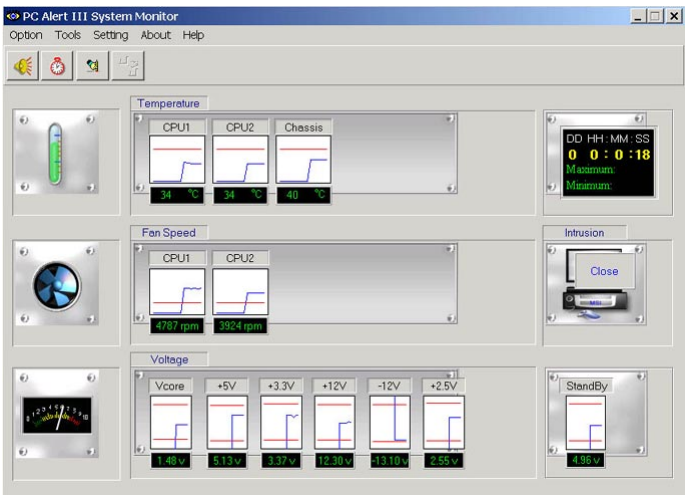
MSI Special Features

PC Alert™ III

The PC Alert™ III is a utility you can find in the CD-ROM disk. The utility is just like your PC doctor that can detect the following PC hardware status during real time operation:

- ✦ monitor CPU & system temperatures
- ✦ monitor fan speed(s)
- ✦ monitor system voltage
- ✦ monitor chassis intrusion

If one of the items above is abnormal, the program main screen will be immediately shown on the screen, with the abnormal item highlighted in red. This will continue to be shown until user disables the warning.



MSI Reminds You...

1. Items shown on PC Alert™ III vary depending on your system status.

2. The mainboard bound with mBMC chip (Server Management Features) won't support PC Alert™ III.

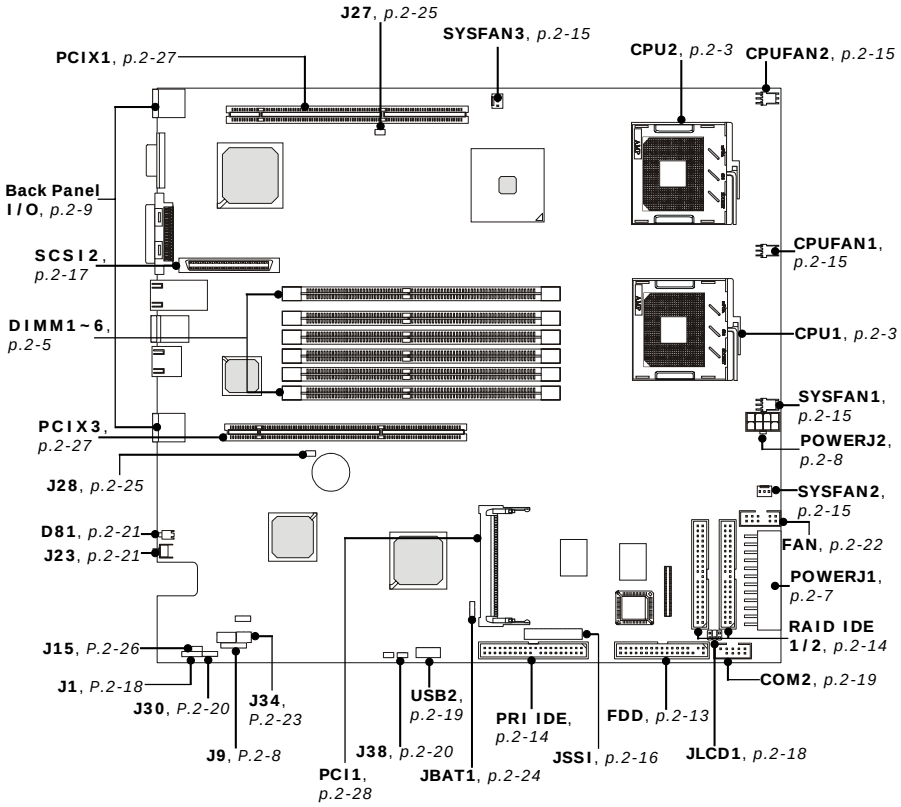
2

Hardware Setup

This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

Use a grounded wrist strap before handling computer components. Static electricity may damage the components.

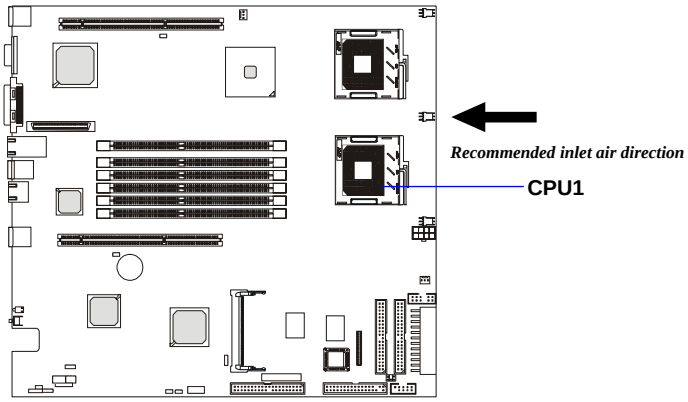
Quick Components Guide



Central Processing Unit: CPU

The mainboard supports **Single/Dual** Intel® Xeon™ processor(s). The mainboard uses two CPU sockets called Socket 604 for easy CPU installation. You can install SINGLE or DUAL CPUs on the board to meet your own needs. Keep the following points in mind before installing CPU(s):

1. If **SINGLE** CPU is intended, always install the CPU on the **CPU1** socket.



2. To install **DUAL** CPUs on the board, you must use **the same type of CPUs running at the same FSB frequency**.

When you are installing the CPU, **make sure the CPU has a Heat Sink and a cooling fan attached on the top to prevent overheating.** If you do not find the Heat Sink and cooling fan, contact your dealer to purchase and install them before turning on the computer.

MSI Reminds You...
Overheating will seriously damage the CPU and system, always make sure the cooling fan can work properly to protect the CPU from overheating.
The system temperature needs to remain under 45°C.
We highly recommend that the direction of inlet air should follow the direction indicated above for better cooling effect.

CPU Installation Procedures for Socket 604

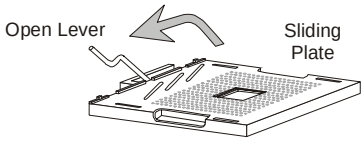
1. Please turn off the power and unplug the power cord before installing the CPU.

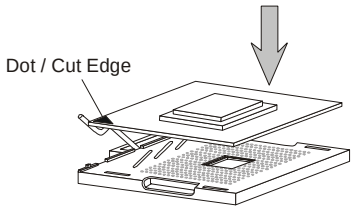
2. Pull the lever sideways away from the socket. Make sure to raise the lever up to a 90-degree angle.

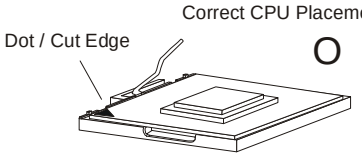
3. Look for the cut edge. The cut edge should point towards the lever pivot. The CPU can only fit in the correct orientation.

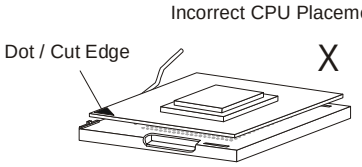
4. If the CPU is correctly installed, the pins should be completely embedded into the socket and can not be seen. Please note that any violation of the correct installation procedures may cause permanent damages to your mainboard.

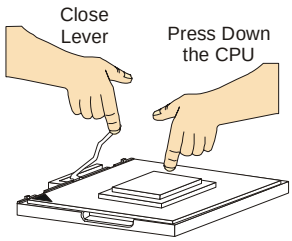
5. Press the CPU down firmly into the socket and close the lever. As the CPU is likely to move while the lever is being closed, always close the lever with your fingers pressing tightly on top of the CPU to make sure the CPU is properly and completely embedded into the socket.





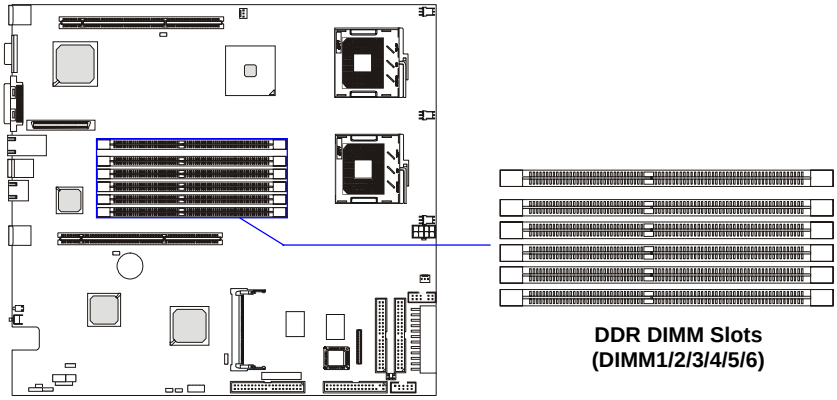






Memory

The mainboard provides 6 slots for 184-pin DDR SDRAM DIMM (Double In-Line Memory Module) modules and supports up to 12GB memory size. You can install PC2100/DDR266 or PC1600/DDR200 modules on the DDR DIMM slots (DIMM 1~6).



DDR DIMM Slots (DIMM1/2/3/4/5/6)

Memory Speed/CPU FSB Support Matrix

	DDR200	DDR266
400MHz FSB	Yes	Yes
533MHz FSB	No	Yes

DIMM Module Combination

The mainboard supports **dual channel** (144-bit wide) DDR266/200 memory interface. Each channel supports 3 DIMM slots.

Each DIMM slot supports up to a maximum size of 2GB. Users can install either single- or double-sided modules depending on their needs, but memory modules must be installed on the board **IN PAIRS**.

Memory modules can be installed in any combination as follows:

Slot	Memory Module Population Rules						
DIMM 1	Install			Install (1)		Install (1)	Install (1)
DIMM 2	Install			Install (1)		Install (1)	Install (1)
DIMM 3		Install		Install (2)	Install (1)		Install (2)
DIMM 4		Install		Install (2)	Install (1)		Install (2)
DIMM 5			Install		Install (2)	Install (2)	Install (3)
DIMM 6			Install		Install (2)	Install (2)	Install (3)

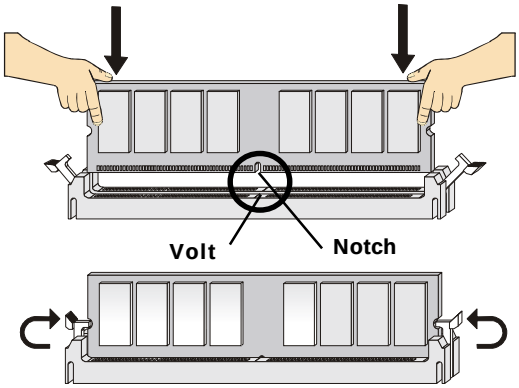
MSI Reminds You...
*Make sure that you install memory modules of **the same type and density** on DDR DIMMs "in pairs" -- {DIMM1 & DIMM2}, {DIMM3 & DIMM4}, {DIMM5 & DIMM6}.*

Installing DDR Modules

1. The DDR DIMM has only one notch on the center of module. The module will only fit in the right orientation.
2. Insert the DIMM memory module vertically into the DIMM slot. Then push it in until the golden finger on the memory module is deeply inserted in the socket.

MSI Reminds You...
You can barely see the golden finger if the module is properly inserted in the socket.

3. The plastic clip at each side of the DIMM slot will automatically close.

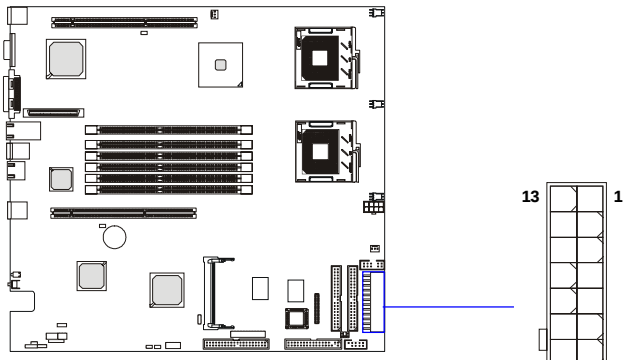


Power Supply

The mainboard supports SSI power supply for the power system. Before inserting the power supply connector, always make sure that all components are installed properly to ensure that no damage will be caused.

SSI 24-Pin Power Connector: POWERJ1

This connector allows you to connect an SSI power supply. To connect the SSI power supply, make sure the plug of the power supply is inserted in the proper orientation and the pins are aligned. Then push down the power supply firmly into the connector.



POWERJ1 Pin Definition

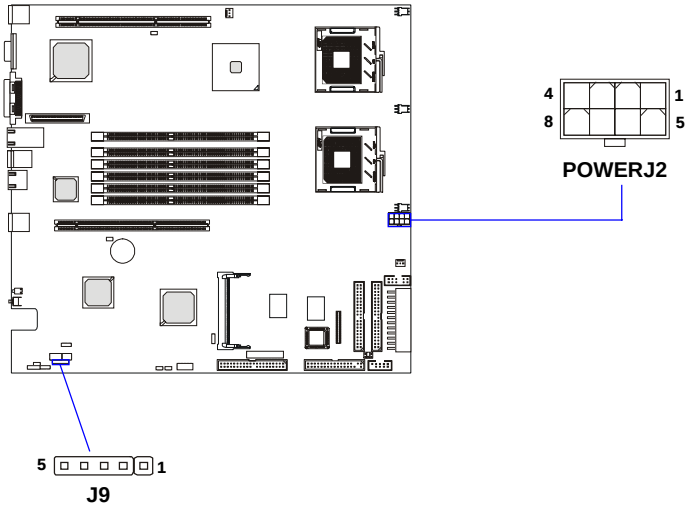
PIN	SIGNAL	PIN	SIGNAL
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS-ON#
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWR OK	20	Res
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

SSI 8-Pin Power Connector: POWERJ2

This connector is an optional power connector to provide 12V power output.

SSI 5-Pin Power Connector: J9

This connector provides power supply to the System Management Bus (SMB).



J9 Pin Definition

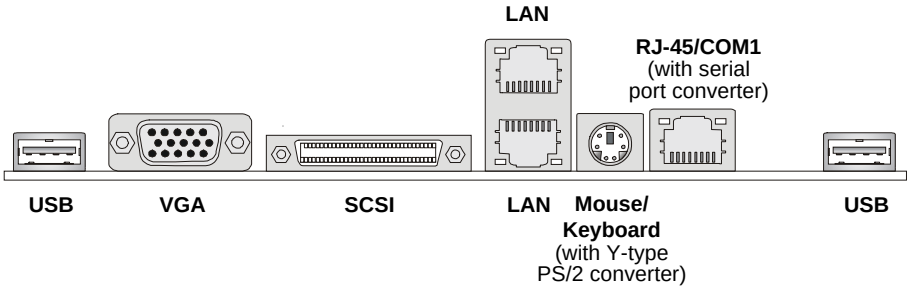
PIN	SIGNAL
1	SMB clock
2	SMB data
3	PS alert
4	GND
5	3.3RS

POWERJ2 Pin Definition

PIN	SIGNAL	PIN	SIGNAL
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

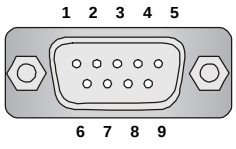
Back Panel

The back panel provides the following connectors:



Serial Port Connector: RJ-45/COM1

A serial port converter is provided in the mainboard package to convert the onboard RJ-45/COM1 port from the RJ-45 LAN jack into standard 9-pin serial port COM1. The serial port is a 16550A high speed communication port that sends/receives 16 bytes FIFOs. You can attach a serial mouse or other serial device directly to it.



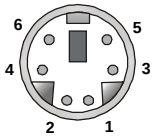
COM1

Pin Definition

PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carry Detect
2	SIN	Serial In or Receive Data
3	SOUT	Serial Out or Transmit Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicate

Mouse/Keyboard Connector

The mainboard provides a standard PS/2® mouse/keyboard mini DIN connector for attaching a PS/2® mouse/keyboard. You can plug a PS/2® mouse/keyboard directly into this connector or use the provided Y-type PS/2 converter to simultaneously connect to a mouse & a keyboard.



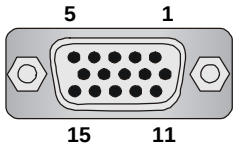
PS/2 Mouse/Keyboard (6-pin Female)

Pin Definition

PIN	SIGNAL	DESCRIPTION
1	Keyboard Data	Mouse/Keyboard data
2	Mouse Data	Mouse Data
3	GND	Ground
4	VCC	+5V
5	Keyboard Clock	Keyboard clock
6	Mouse Clock	Mouse Clock

VGA DB 15 Pin Connector

One DB 15-pin VGA connector is provided for connection to a VGA monitor.



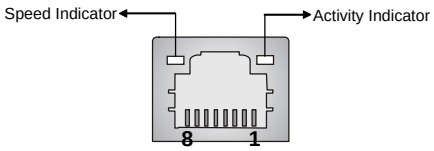
DB 15-Pin Female Connector

Pin Definition

Analog Video Display Connector (DB-15S)	
PIN	**SIGNAL DESCRIPTION**
1	Red
2	Green
3	Blue
4	Not used
5	Ground
6	Ground
7	Ground
8	Ground
9	Power
10	Ground
11	Not used
12	SDA
13	Horizontal Sync
14	Vertical Sync
15	SCL

RJ-45 LAN Jack: Giga-bit LAN

The mainboard provides one standard RJ-45 jack for connection to Local Area Network (LAN). Giga-bit LAN enables data to be transferred at 1000, 100 or 10Mbps. Pin assignments vary depending on the transfer rates: 10/100Mbps or 1000Mbps. Note that Pin 1/2, 3/6, 4/5, 7/8 must work in pairs. Please refer to the following for details:



RJ-45 LAN Jack

10/100 LAN Pin Definition

PIN	SIGNAL	DESCRIPTION
1	TDP	Transmit Differential Pair
2	TDN	Transmit Differential Pair
3	RDP	Receive Differential Pair
4	NC	Not Used
5	NC	Not Used
6	RDN	Receive Differential Pair
7	NC	Not Used
8	NC	Not Used

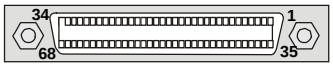
Giga-bit LAN Pin Definition

PIN	SIGNAL	DESCRIPTION
1	D0P	Differential Pair 0+
2	D0N	Differential Pair 0-
3	D1P	Differential Pair 1+
4	D2P	Differential Pair 2+
5	D2N	Differential Pair 2-
6	D1N	Differential Pair 1-
7	D3P	Differential Pair 3+
8	D3N	Differential Pair 3-

Ultra320 SCSI Connector: SCSI 3 (Channel A)

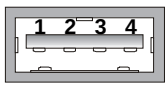
SCSI (Small Computer System Interface) is a parallel interface standard for attaching peripheral devices to computers. Ultra320 SCSI is the seventh generation of SCSI I/O technology, and has a maximum data rate speed of 320 MB/sec. SCSI's commitment to backward compatibility and legacy support are the primary reasons for its durability as an I/O interface, making SCSI the industry standard for disk drive connection in virtually all high-performance servers. For detailed pin assignments, please refer to p. 2-17.

SCSI 3



USB Ports

The back panel provides four UHCI (Universal Host Controller Interface) USB (Universal Serial Bus) 1.1 ports for attaching USB devices such as keyboard, mouse or other USB-compatible devices. You can plug USB devices directly into the ports.



USB Port

Pin Definition

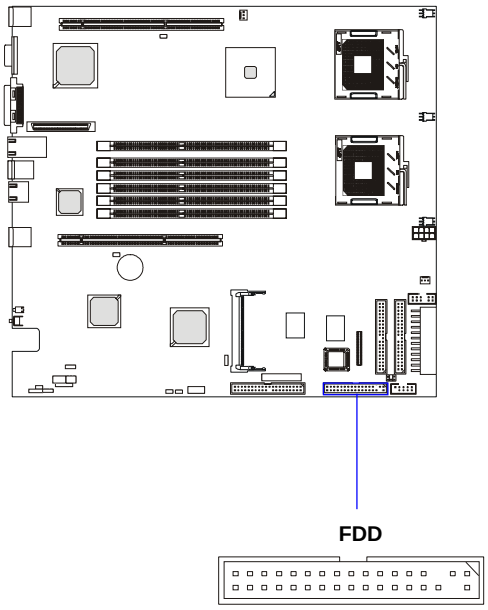
PIN	SIGNAL	DESCRIPTION
1	VCC	+5V
2	-Data 0	Negative Data Channel 0
3	+Data0	Positive Data Channel 0
4	GND	Ground

Connectors

The mainboard provides connectors to connect FDD, IDE HDD, front panel of the system case, audio ports, USB Ports, and CPU/System FANs.

Floppy Disk Drive Connector: FDD

The mainboard provides a standard floppy disk drive connector that supports 360K, 720K, 1.2M, 1.44M and 2.88M floppy disk types.



ATA100 Connector: PRI IDE

The mainboard offers one Ultra ATA/100 hard drive connector.

ATA133 RAID Connectors: RAID IDE1, RAID IDE2

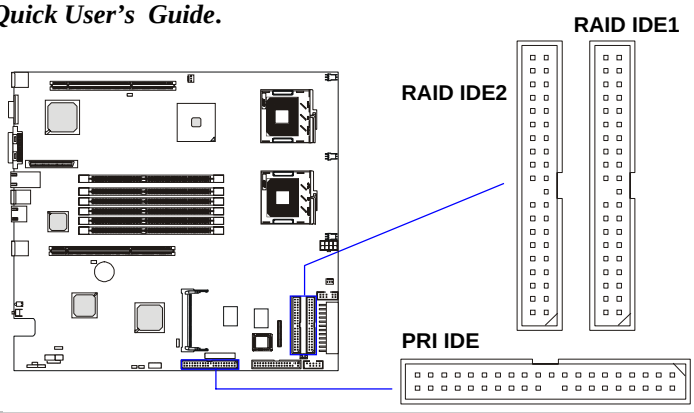
The mainboard supports high-end Ultra ATA/133 RAID (0, 1, or 0+1) hard drive interface specifications as well.

The Ultra ATA/133 interface boosts data transfer rates between the computer and the hard drive up to 133 megabytes (MB) per second. The new interface is one-third faster than earlier record-breaking Ultra ATA/100 technology and is backwards-compatible with the existing Ultra ATA interface.

The low-cost RAID (Redundant Array of Independent Disks) solution integrates two IDE RAID connectors that support PIO mode 0-4, Bus Master, and Ultra DMA 33/66/100/133 modes. The IDE RAID connectors allow you to connect Ultra ATA/DMA hard disks and use RAID technology (RAID 0 striping or RAID 1 mirroring) for high performance, data security and fault tolerance.

ATA133 RAID Connectors

- You can connect a Master drive to each IDE RAID connector.
- The two connectors support **hard disk drives** only.
- For more information on ATA133 RAID, please refer to ***ATA133 RAID 0 or 1 Quick User's Guide.***

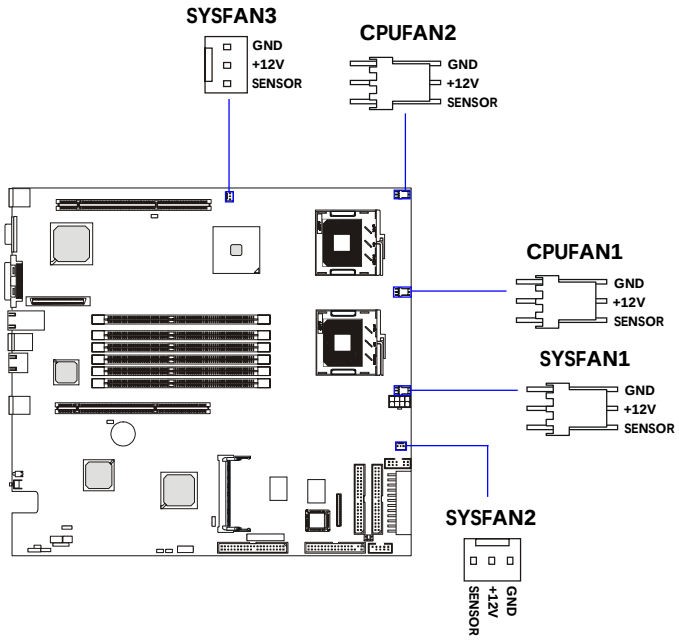


MSI Reminds You...

If you install two hard disks on cable, you must configure the second drive to Slave mode by setting its jumper. Refer to the hard disk documentation supplied by hard disk vendors for jumper setting instructions.

Fan Power Connectors: CPUFAN1/2, SYSFAN1/2/3

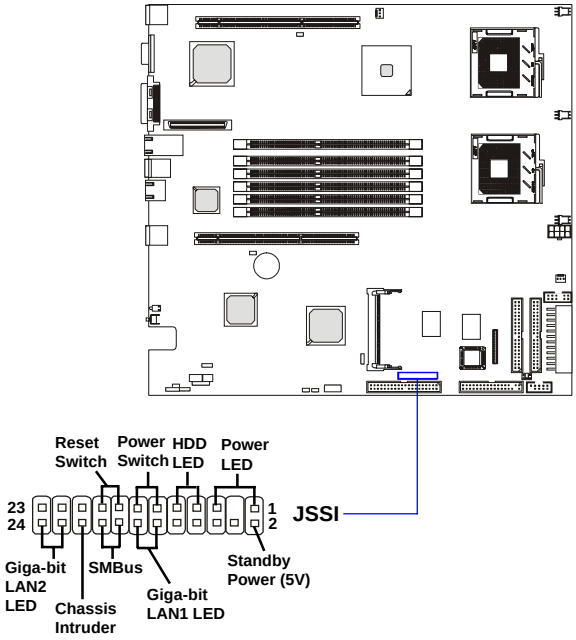
The CPUFAN1/2 (processor fan) and SYSFAN1/2/3 (system fan) support system cooling fan with +12V. It supports three-pin head connector. When connecting the wire to the connectors, always take note that the red wire is the positive and should be connected to the +12V, the black wire is Ground and should be connected to GND. If the mainboard has a System Hardware Monitor chipset on-board, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.



MSI Reminds You...
Always consult the vendors for proper CPU cooling fan.

Front Panel Connector: JSSI

The mainboard provides one front panel connector for electrical connection to the front panel switches and LEDs.

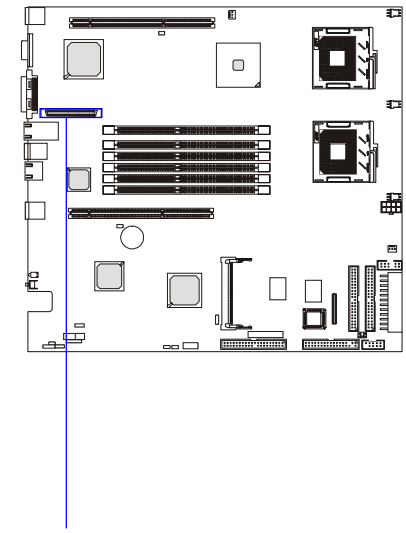


JSSI Pin Definition

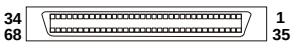
Pin	Description	Pin	Description
1	Power LED +	2	5Vs/b
3	Key	4	No Connection
5	Power LED -	6	No Connection
7	HDD Activity LED +	8	System Status LED +
9	HDD Activity LED -	10	System Status LED -
11	Power Switch+	12	NIC Activity LED +
13	Power Switch- (GND)	14	NIC Activity LED -
15	Reset Switch+	16	SMBus SDA
17	Reset Switch- (GND)	18	SMBus SCL
19	ACPI Sleep Switch	20	Chassis Intrusion
21	ACPI Sleep Switch (GND)	22	NIC#2 Activity LED +
23	NMI to CPU Switch	24	NIC#2 Activity LED -

Ultra320 SCSI Connector: SCSI 2 (Channel B)

SCSI (Small Computer System Interface) is a parallel interface standard for attaching peripheral devices to computers. Ultra320 SCSI is the seventh generation of SCSI I/O technology, and has a maximum data rate speed of 320 MB/sec. SCSI's commitment to backward compatibility and legacy support are the primary reasons for its durability as an I/O interface, making SCSI the industry standard for disk drive connection in virtually all high-performance servers.



SCSI 2

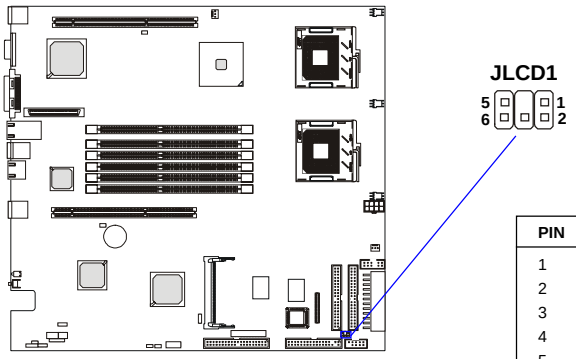


68-Pin Ultra320 SCSI Connector

Pin	Description	Pin	Description
1	+DB(12)	35	-DB(12)
2	+DB(13)	36	-DB(13)
3	+DB(14)	37	-DB(14)
4	+DB(15)	38	-DB(15)
5	+DB(P1)	39	-DB(P1)
6	+DB(0)	40	-DB(0)
7	+DB(1)	41	-DB(1)
8	+DB(2)	42	-DB(2)
9	+DB(3)	43	-DB(3)
10	+DB(4)	44	-DB(4)
11	+DB(5)	45	-DB(5)
12	+DB(6)	46	-DB(6)
13	+DB(7)	47	-DB(7)
14	+DB(P)	48	-DB(P)
15	GROUND	49	GROUND
16	DIFFSENS	50	GROUND
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20	GROUND	54	GROUND
21	+ATN	55	-ATN
22	GROUND	56	GROUND
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MST
27	+SEL	61	-SEL
28	+C/D	62	-C/D
29	+REQ	63	-REQ
30	+I/O	64	-I/O
31	+DB(8)	65	-DB(8)
32	+DB(9)	66	-DB(9)
33	+DB(10)	67	-DB(10)
34	+DB(11)	68	-DB(11)

LCD Panel Connector: JLCD1

The connector is additionally provided for connection to a LCD panel, which shows information on the panel for you to identify the current status or mode of the connected system.



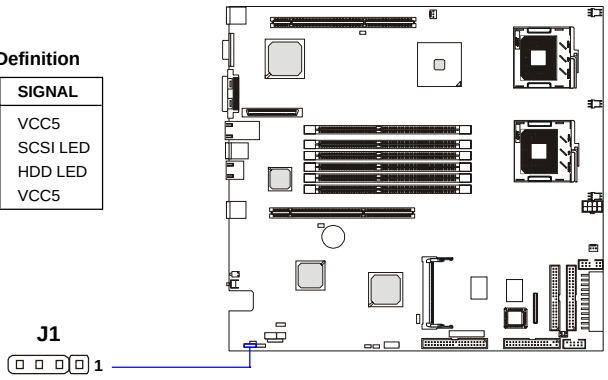
PIN	SIGNAL
1	TX
2	RX
3	NC
4	GND1
5	GND0
6	VCC

SCSI LED Connector: J1 (optional)

The connector is used to connect to a LED for showing the activity of SCSI devices attached to either SCSI 2 or SCSI 3 connector.

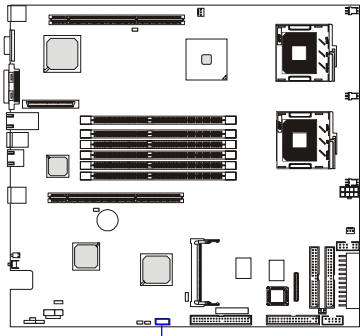
Pin Definition

PIN	SIGNAL
1	VCC5
2	SCSI LED
3	HDD LED
4	VCC5



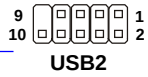
Front USB Connector: USB2

The mainboard provides one front Universal Serial Bus connector for users to connect to USB ports.



Pin Definition

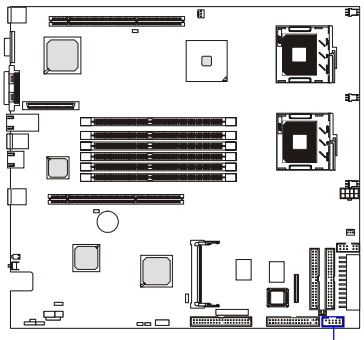
Pin	Description	Pin	Description
1	USBPWR	2	USBPWR
3	USBP2-	4	USBP3-
5	USBP2+	6	USBP3+
7	GND	8	GND
9	NC	10	GND



USB2

Serial Port Connector: COM 2

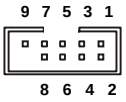
The mainboard offers one 9-pin header as serial port COM 2. The port is a 16550A high speed communication port that sends/receives 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to it.



Pin Definition

PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carry Detect
2	SIN	Serial In or Receive Data
3	SOUT	Serial Out or Transmit Data
4	DTR	Data Terminal Ready)
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicate

COM 2

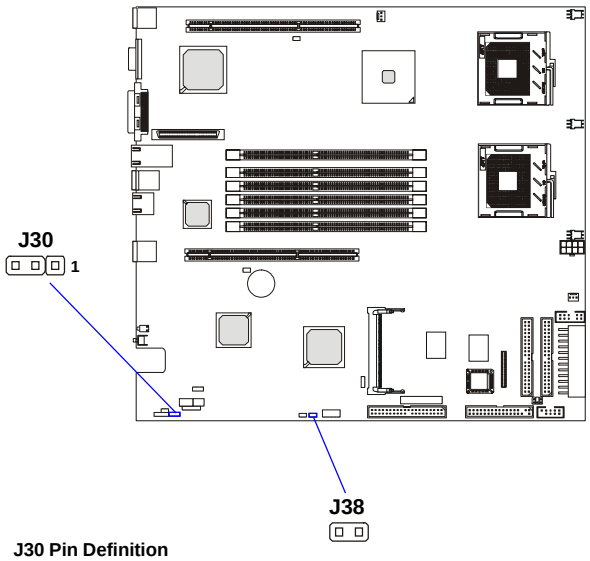


System ID LED Connector: J30

The connector is used to connect the System ID LED on the front panel. Please note that this connector is specifically designed for MSI MS-9206 & MS-9214 rackmount servers only.

System ID Button Connector: J38

The connector is used to connect the System ID Button on the front panel to facilitate system management. Please note that this connector is specifically designed for MSI MS-9206 & MS-9214 rackmount servers only.



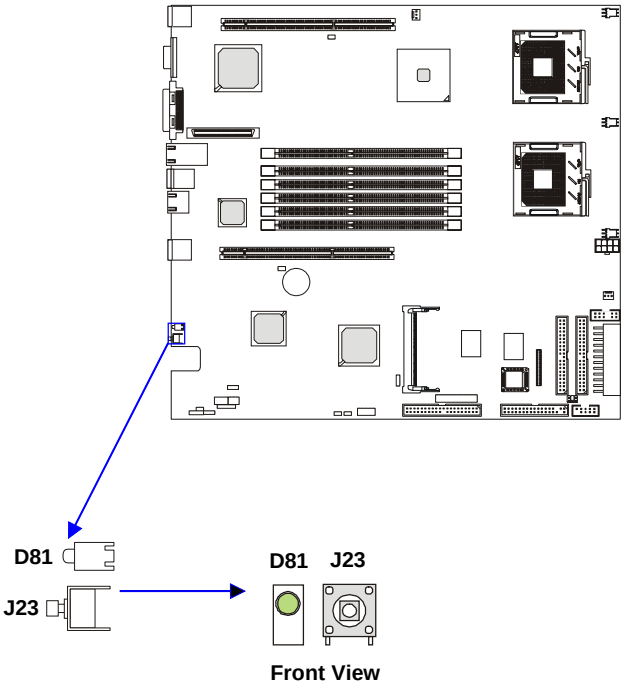
J30 Pin Definition

PIN	SIGNAL
1	GND
2	LED1
3	LED2

System ID Button: J23

System ID LED: D81

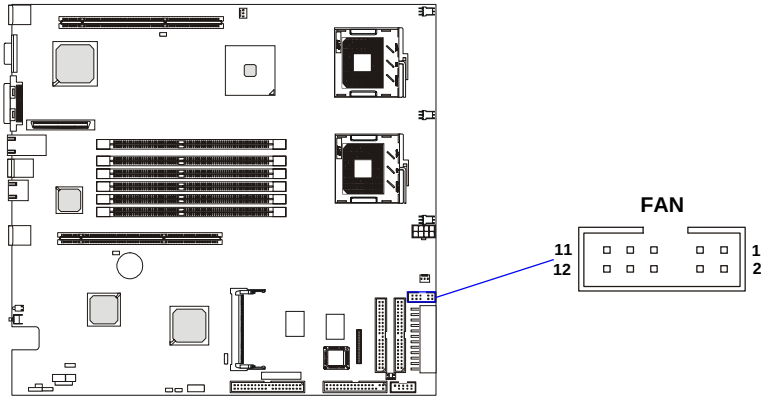
A better understanding of any on-going service sharing action will help to enhance system management. When the J23 button is pressed and the D81 LED lights up, the server manager will immediately know that the remote subsystems are currently sharing certain services to his system. By pressing the J23 button again, the D81 LED will go out. Please note that this function is specifically designed for MSI MS-9206 & MS-9214 rackmount servers only.



Five-Fan Module Power Connector: FAN

A module consisting of five 40mm, multi-speed fans provides the primary airflow for the system. A 12-wire cable/connector provides the fan module with power and tach lines, allowing each fan to be monitored independently by server management software. The power cable is connected to a 12-pin header located on the mainboard.

The fan module is a single component. The individual fans that make up the module are not swappable or individually replaceable. Should a fan fail, the entire module will need to be replaced. A tab on the side of the fan module makes replacement of the module tool-less and very simple. As the fan module is not hot swappable, the server must be turned off before the fan module can be replaced.

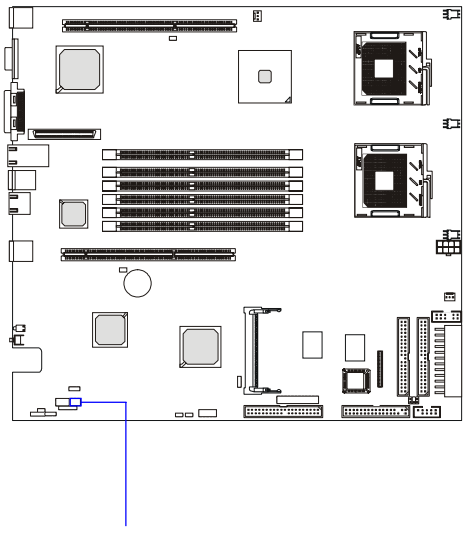


Pin Definition

PIN	SIGNAL	TYPE	DESCRIPTION
1	Common	Power	Ground connection between fanboard & serverboard
2	Common	Power	Ground connection between fanboard & serverboard
3	Common	Power	Ground connection between fanboard & serverboard
4	PWM_Power	Power	Power connection between fanboard & serverboard
5	PWM_Power	Power	Power connection between fanboard & serverboard
6	PWM_Power	Power	Power connection between fanboard & serverboard
7	PWM_Power	Power	Power connection between fanboard & serverboard
8	Tach1	In	Tachometer for fan1 (innermost fan)
9	Tach2	In	Tachometer for fan2
10	Tach3	In	Tachometer for fan3
11	Tach4	In	Tachometer for fan4
12	Tach5	In	Tachometer for fan5 (outermost fan - close to wall of chassis)

6-pin I2C Bus Connector: J34

The mainboard provides one I2C (also known as I^2C) Bus connector for users to connect to System Management Bus (SMBus) interface.



J34 Pin Definition

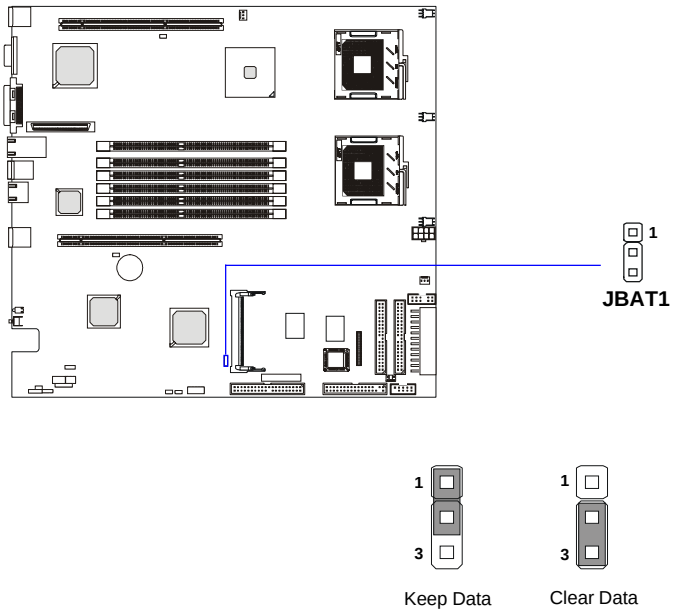
PIN	SIGNAL
1	SMBUS_SDA
2	GND
3	SMBUS_SCL
4	5VCC
5	SMBUS_ALERT#
6	PCIRST#

Jumpers

The motherboard provides the following jumpers for you to set the computer's function. This section will explain how to change your motherboard's function through the use of jumpers.

Clear CMOS Jumper: JBAT1

There is a CMOS RAM on board that has a power supply from external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, use the JBAT1 (Clear CMOS Jumper) to clear data. Follow the instructions below to clear the data:

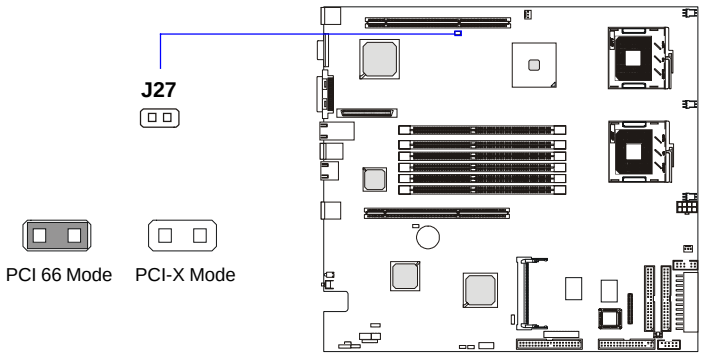


MSI Reminds You...

You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 pin position. Avoid clearing the CMOS while the system is on; it will damage the mainboard.

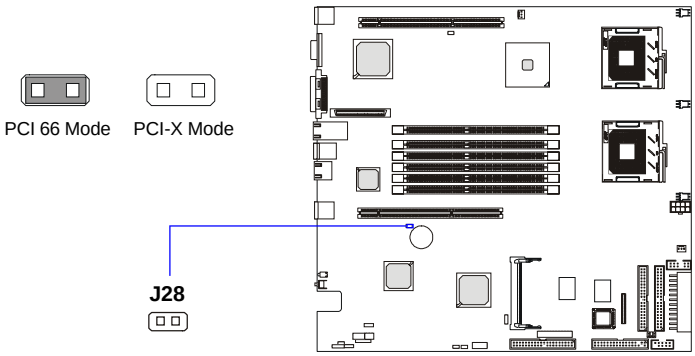
PCIX Channel A Frequency Jumper: J27

The jumper is used to set the channel A of 64-bit PCI bus (PCIX) to run at PCI 66 Mode or PCI-X Mode. Channel A includes *SCSI interface* and *64-bit PCIX1 slot*.



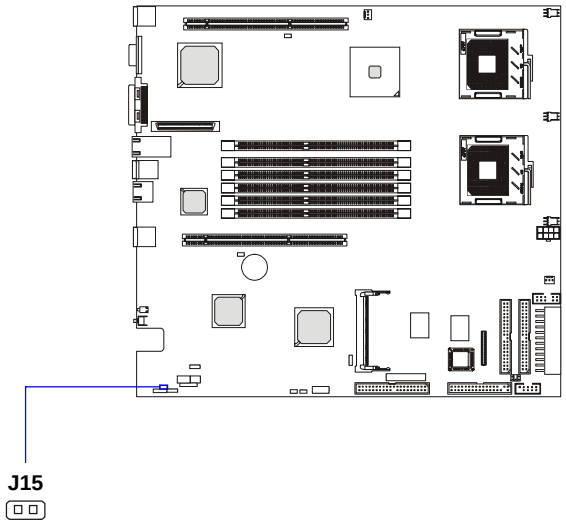
PCIX Channel B Frequency Jumper: J28

The jumper is used to set the channel B of 64-bit PCI bus (PCIX) to run at PCI 66 Mode or PCI-X Mode. Channel B includes *Giga-bit LAN* and *64-bit PCIX3 slot*.



VGA Disable/Enable Jumper: J15

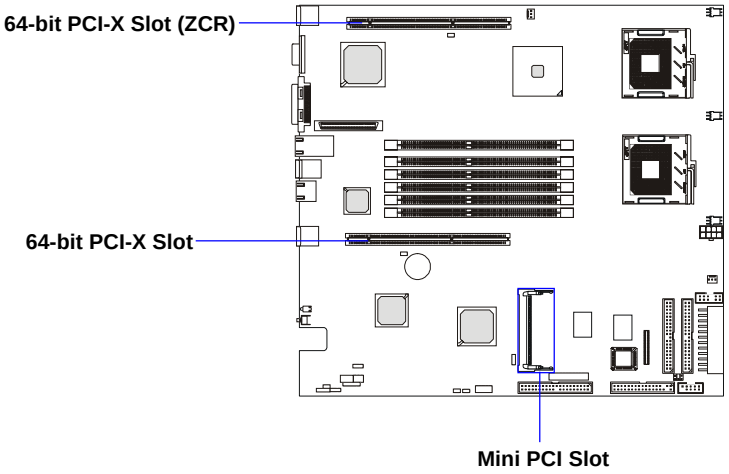
This jumper is used to enable or disable the onboard VGA.



Disable VGA Enable VGA

Slots

The motherboard provides two 64-bit Master PCI-X bus slots and one Mini PCI slot.



PCI (Peripheral Component Interconnect) Slots

The PCI slots allow you to insert the expansion cards to meet your needs. When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to make any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration. The mainboard provides two Master 64-bit PCI (also called *PCI-X*) bus slots and one Mini PCI slot.

64-bit PCI-X bus: The bus has 64 data lines and runs at 100MHz. With twice data lines and much faster PCI clock, the 64-bit PCI bus increases the throughput and overall system performance. *The 64-bit **PCIX1 Slot** in **GREEN** color is the only PCI slot where the **Zero Channel RAID (ZCR) card** can be installed.*

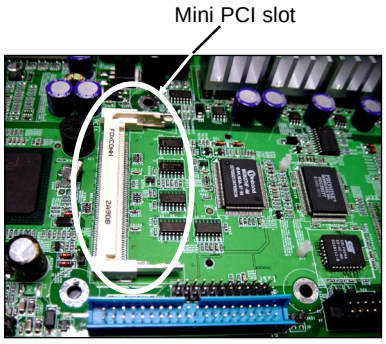
Mini PCI bus

This bus is used to connect the optional MS-9518 SCSI card.

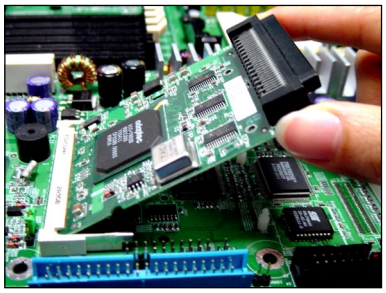
MS-9518 SCSI card

Installing the card:

1. Locate the Mini PCI slot on the mainboard.



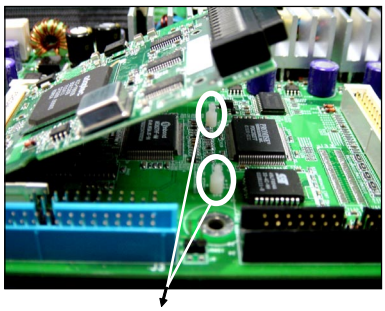
2. Place the card over the Mini PCI slot and gently insert both ends of the card slantways (at an angle of 45 degrees) into the slot until the golden finger of the card gets fully inserted into the slot.



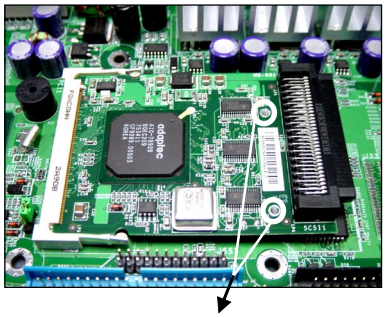
MSI Reminds You...

You can barely see the golden finger if the card is properly inserted in the socket.

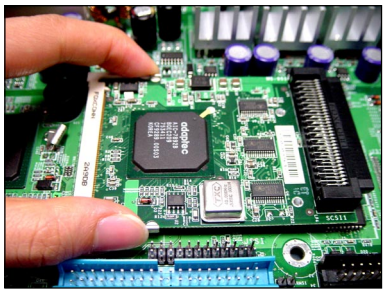
3. Locate the supporters on the mainboard (one on the right end and the other on the left end).



4. Align the two fixing holes on the card with the supporters and press the card carefully down until the fixing holes get locked by the supporters.

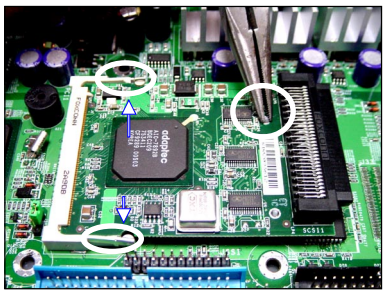


5. Push the retaining clips (on two ends of the slot) inwards until they lock onto the notches in the ends of the card. The card should securely fit into the slot.

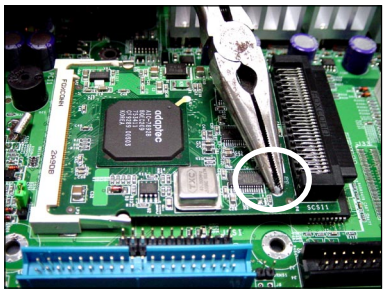


Removing the card:

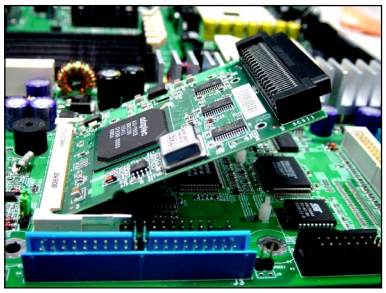
1. Gently push the retaining clips outwards. Hold the card lightly but firmly. Use long nose pliers to clip one of the supporters and press it downwards until it withdraws from the fixing hole.



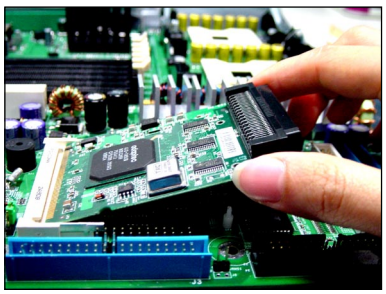
2. Clip the other supporter and press it downwards until it withdraws from the fixing hole.



3. The card will automatically bound upwards after being released from the supporters.



4. Remove the card from the Mini PCI slot.



PCI Interrupt Request Routing

The IRQ, acronym of interrupt request line and pronounced I-R-Q, are hardware lines over which devices can send interrupt signals to the microprocessor. The PCI IRQ pins are typically connected to the PCI bus INT A# ~ INT D# pins as follows:

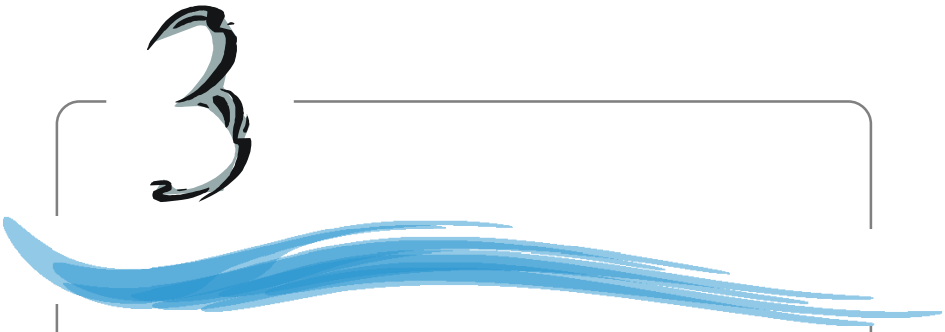
PCI-32 IRQ Routing (for ICH3)

PCI Device	INT A	INT B	INT C	INT D
Mini PCI	PIRQ#A	PIRQ#B	PIRQ#C	PIRQ#D
VGA	PIRQ#D			
IPMI	PIRQ#A			
P64H2	PIRQ#B			
IDE RAID	PIRQ#C			

Primary IDE Interrupt: IRQ14 (for ICH3)

PCI-64 IRQ Routing

PCI Device	INT A	INT B	INT C	INT D
PCIX Slot1	PAIRQ#2	PAIRQ#3	PAIRQ#0	PAIRQ#1
SCSI	PAIRQ#0	PAIRQ#1		
PCIX Slot3	PBIRQ#7	PBIRQ#8	PBIRQ#9	PBIRQ#6
G-LAN	PBIRQ#0	PBIRQ#1		



BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use. You may need to run the Setup program when:

- An error message appears on the screen during the system booting up, and requests you to run SETUP.
- You want to change the default settings for customized features.

Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <DEL> key to enter Setup.

```
Press DEL to enter SETUP
```

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it OFF and On or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Control Keys

<↑>	Move to the previous item
<↓>	Move to the next item
<←>	Move to the item in the left hand
<→>	Move to the item in the right hand
<Enter>	Select the item
<Esc>	Jumps to the Exit menu or returns to the main menu from a submenu
<+/PU>	Increase the numeric value or make changes
<-/PD>	Decrease the numeric value or make changes
<F1>	General help, only for Status Page Setup Menu and Option Page Setup Menu
<F5>	Restore the previous CMOS value from CMOS, only for Option Page Setup Menu
<F6>	Load Fail-Safe Defaults
<F7>	Load Optimized Defaults
<F10>	Save all the CMOS changes and exit

Getting Help

After entering the Setup menu, the first menu you will see is the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the arrow keys (↑↓) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

Sub-Menu

If you find a right pointer symbol (as shown in the right view) appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys (↑↓) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc >.

General Help <F1>

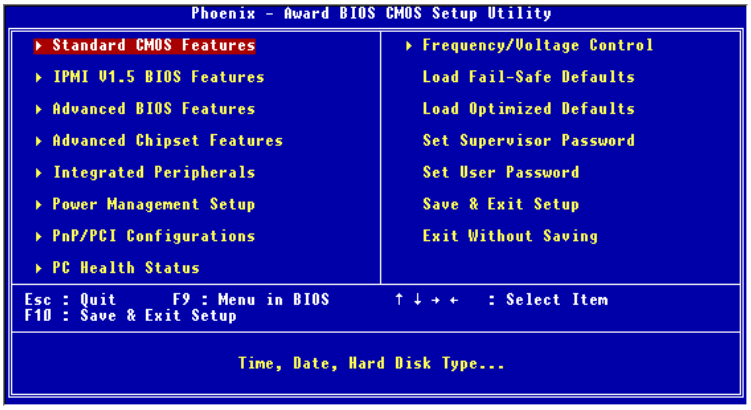
The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

MSI Reminds You...

The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

The Main Menu

Once you enter Phoenix-Award BIOS CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu displays thirteen configurable functions and two exit choices. Use arrow keys to move among the items and press <Enter> to enter the sub-menu.



Standard CMOS Features
Use this menu for basic system configurations, such as time, date etc.

IPMI V1.5 BIOS Features *(for mainboards with mBMC chip)*
Use this menu to configure the Platform Event Filter (PEF) status and WatchDog TimeOut features.

Advanced BIOS Features
Use this menu to configure the special enhanced features.

Advanced Chipset Features
Use this menu to change the values in the chipset registers and optimize your system's performance.

Integrated Peripherals
Use this menu to specify your settings for integrated peripherals.

Power Management Setup
Use this menu to specify your settings for power management.

PNP/PCI Configurations
This entry appears if your system supports PnP/PCI.

PC Health Status *(for mainboards without mBMC chip)*
This entry shows your PC health status.

Frequency/Voltage Control
Use this menu to specify your settings for frequency/voltage control.

Load Fail-Safe Defaults
Use this menu to load the BIOS default values for minimal but stable system performance.

Load Optimized Defaults
Use this menu to load the BIOS default values that are factory settings for optimal system operations.

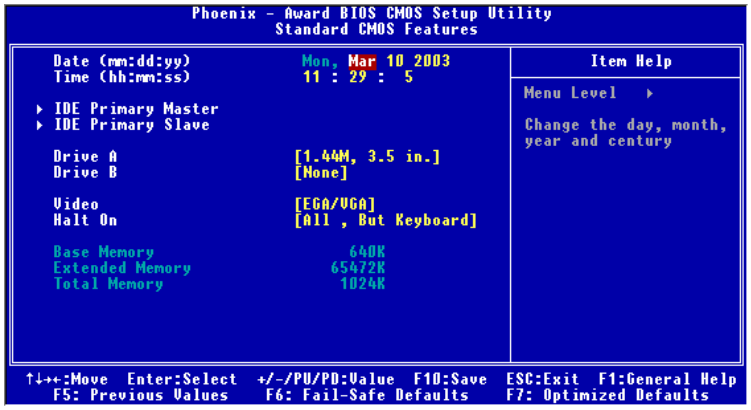
Set Supervisor/User Password
Use this menu to set user and supervisor passwords.

Save & Exit Setup
Save changes to CMOS and exit setup.

Exit Without Saving
Abandon all changes and exit setup.

Standard CMOS Features

The items inside Standard CMOS Features menu are divided into 10 categories. Each category includes none, one or more setup items. Use the arrow keys to highlight the item you want to modify and use the <PgUp> or <PgDn> keys to switch to the value you prefer.


Phoenix - Award BIOS CMOS Setup Utility
Standard CMOS Features
Date (mm:dd:yy) Mon, Mar 10 2003
Time (hh:mm:ss) 11 : 29 : 5
IDE Primary Master
IDE Primary Slave
Drive A [1.44M, 3.5 in.]
Drive B [None]
Video [EGA/VGA]
Halt On [All , But Keyboard]
Base Memory 640K
Extended Memory 65472K
Total Memory 1024K
Item Help
Menu Level
Change the day, month, year and century
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Date (mm:dd:yy)

This allows you to set the system to the date that you want (usually the current date). The format is <day><month> <date> <year>.

day	Day of the week, from Sun to Sat, determined by BIOS. Read-only.
month	The month from Jan. through Dec.
date	The date from 1 to 31 can be keyed by numeric function keys.
year	The year can be adjusted by users.

Time (hh:mm:ss)

This allows you to set the system time that you want (usually the current time). The time format is <hour> <minute> <second>.

IDE Primary Master/Slave

Press PgUp/<+> or PgDn/<-> to select *Manual*, *None*, *Auto* type. Note that the specifications of your drive must match with the drive table. The hard disk will not work properly if you enter improper information for this category. If

your hard disk drive type is not matched or listed, you can use *Manual* to define your own drive type manually.

If you select *Manual*, related information is asked to be entered to the following items. Enter the information directly from the keyboard. This information should be provided in the documentation from your hard disk vendor or the system manufacturer.

If the controller of HDD interface is SCSI, the selection shall be "*None*". If the controller of HDD interface is CD-ROM, the selection shall be "*None*".

Access Mode	The settings are *CHS*, *LBA*, *Large*, *Auto*.
Capacity	The formatted size of the storage device.
Cylinder	Number of cylinders.
Head	Number of heads.
Precomp	Write precompensation.
Landing Zone	Cylinder location of the landing zone.
Sector	Number of sectors.

Drive A/B
This item allows you to set the type of floppy drives installed. Available options are *None*, *360K, 5.25 in.*, *1.2M, 5.25 in.*, *720K,* 3.5 in., *1.44M, 3.5 in.*, *2.88M, 3.5 in.*

Video
The setting controls the type of video adapter used for the primary monitor of the system. Available options are *EGA/VGA* , *CGA 40*, *CGA 80* and *Mono*.

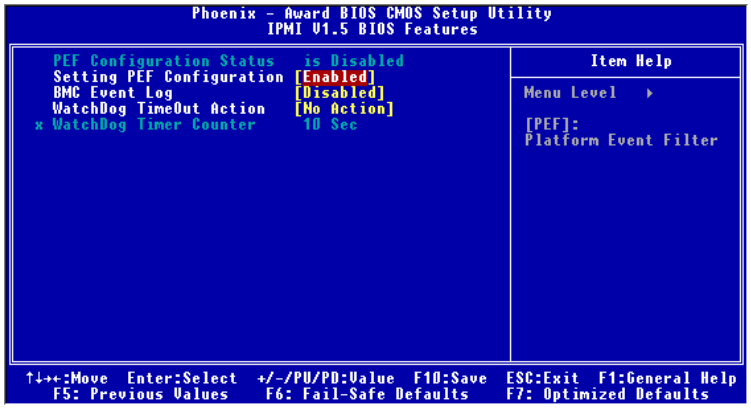
Halt On
The setting determines whether the system will stop if an error is detected at boot. Available options are:

All Errors	The system stops when any error is detected.
No Errors	The system doesn't stop for any detected error.
All, But Keyboard	The system doesn't stop for a keyboard error.
All, But Diskette	The system doesn't stop for a disk error.
All, But Disk/Key	The system doesn't stop for either a disk or a keyboard error.

Base/Extended/Total Memory
The three items show the memory status of the system. (Read-only)

IPMI V1.5 BIOS Features

This setup screen appears ***only when the mBMC chip (for Server Management) is integrated on the mainboard***.


Phoenix - Award BIOS CMOS Setup Utility
IPMI V1.5 BIOS Features
PEF Configuration Status is Disabled
Setting PEF Configuration [Enabled]
BMC Event Log [Disabled]
WatchDog TimeOut Action [No Action]
x WatchDog Timer Counter 10 Sec
Item Help
Menu Level ▸
[PEF]:
Platform Event Filter
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

PEF Configuration Status
This option shows the current Platform Event Filter (PEF) configuration status. (Read only)

Setting PEF Configuration
This setting is used to set the Platform Event Filter (PEF) configuration. When [Enabled] is selected, the server will send the event signal to the BMC. Setting options: *Enabled, Disabled.*

BMC Event Log
Select [Enabled] to store POST error or initial messages to the BMC Event log. If you don't want to store POST error or initial messages to the DMI Event log, select [Disabled]. When [Cleared] is selected, the BMC event log will be cleared at next POST stage. Setting options: *Disabled, Enabled, Cleared.*

WatchDog TimeOut Action
The Watch Dog Timer (WDT) is a special hardware device to monitor if the computer system works normally. If the system does not work normally, it will have some measures to fix up the system. The following actions are avail-

able on expiration of the Watchdog Timer: *No Action, Hard Reset, Power Down, Power Cycle.*

WatchDog Timer Counter
This feature allows users to set the time interval to reboot the computer if a timeout event occurs. Setting options: *10 Sec, 20 Sec, 30 Sec, 40 Sec.*

Advanced BIOS Features

Phoenix - Award BIOS CMOS Setup Utility
Advanced BIOS Features
Fan Speed Control [Disabled]
x Smart Fan Control MSI Def.
Hard Disk Boot Priority [Press Enter]
Virus Warning [Disabled]
CPU L1 & L2 Cache [Enabled]
CPU L3 Cache [Enabled]
Hyper-Threading Technology [Enabled]
Quick Power On Self Test [Enabled]
O/B SCSI & Slot Boot Order [SCSI,Slot]
First Boot Device [CDROM]
Second Boot Device [Floppy]
Third Boot Device [Hard Disk]
Boot Other Device [Enabled]
Swap Floppy Drive [Disabled]
Boot Up Floppy Seek [Enabled]
Floppy Disk Access Control [R/W]
Boot Up NumLock Status [On]
Gate A20 Option [Fast]
Typematic Rate Setting [Disabled]
x Typematic Rate (Chars/Sec) 6
x Typematic Delay (Msec) 250
Security Option [Setup]
MPS Version Control For OS [1.4]
OS Select For DRAM > 64MB [Non-OS2]
Console Redirection [Disabled]
x Baud Rate 19200
Agent Connect via [NULL]
Agent wait time(min) [1]
Agent after boot [Disabled]
Report No FDD For WIN 95 [No]
Small Logo(EPA) Show [Disabled]
DMI Event Log [Enabled]
Clear All DMI Event Log [No]
View DMI Event Log [Enter]
Mark DMI Events as Read [Enter]
Event Log Capacity
Event Log Validity Valid
Item Help
Menu Level
Enable: Enable FAN Speed Control Function
Disable: Disable FAN Speed Control Function
Menu Level
Description : Clear all DMI event logs immediately.
Press [Enter] will pop up a confirm screen. Hit [Y] and [enter], then clear all DMI event logs right now.
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Fan Speed Control
This setting is used to enable/disable the fan speed control function.

Smart Fan Control
This setting controls the Fan PWM Duty Cycle. When setting to *MSI Def.*, the duty cycle will be controlled by BIOS. When setting to *Auto*, the duty cycle will be controlled by fans.

Hard Disk Boot Priority
This setting determines the boot priority of the installed hard disks.

Virus Warning
The item is to set the Virus Warning feature for IDE Hard Disk boot sector protection. If the function is enabled and any attempt to write data into this

area is made, BIOS will display a warning message on screen and beep. Setting options: *Disabled, Enabled*.

CPU L1 & L2 Cache
Cache memory is additional memory that is much faster than conventional DRAM (system memory). When the CPU requests data, the system transfers the requested data from the main DRAM into cache memory, for even faster access by the CPU. The settings enable/disable the internal cache (also known as L1 or level 1 cache) and external cache (also known as L2 or level 2 cache). Setting options: *Disabled, Enabled*.

CPU L3 Cache
Level 3 cache is the extra cache built into motherboards between the microprocessor and the main memory. Located away from the CPU, the L3 cache is slower than the L1 & L2 caches. This setting allows you to turn on or off the L3 cache. Setting options: *Enabled, Disabled*.

Hyper-Threading Technology
With Intel® Hyper-Threading Technology, a single Hyper-Threading-enabled processor can simultaneously process two threads of code, improving the performance of multi-threaded code running on a single processor platform. Setting this function to *Enabled* will improve overall system performance, increase number of users a platform can support, improve reaction and response time, and increase number of transaction that can be executed. Setting options: *Enabled, Disabled*.

MSI Reminds You...
Enabling the functionality of Hyper-Threading Technology for your computer system requires ALL of the following platform Components:
**CPU: Intel® Pentium® 4 or Xeon™ Processors with HT Technology;*
**Chipset: Intel® Chipsets that support HT Technology;*
**BIOS: A BIOS that supports HT Technology and has it enabled;*
**OS: An operating system that supports HT Technology.*
For more information on Hyper-threading Technology, go to:
http://www.intel.com/info/hyperthreading

Quick Power On Self Test
The option speeds up Power On Self Test (POST) after you power on the computer. When setting the item to *Enabled*, BIOS will shorten or skip some check items during POST. Settings: *Enabled*, *Disabled*.

O/B SCSI & Slot Boot Order
This setting determines the boot order of onboard SCSI & slots. Setting options: *[SCSI, Slot], [Slot, SCSI]*.

First/Second/Third Boot Device
The items allow you to set the sequence of boot devices where BIOS attempts to load the disk operating system. The settings are:

Floppy	The system will boot from floppy drive.
LS120	The system will boot from LS-120 drive.
Hard Disk	The system will boot from the HDD.
CDROM	The system will boot from the CD-ROM.
ZIP100	The system will boot from ATAPI ZIP drive.
LAN	The system will boot from the onboard 10/100 Network drive.
Disabled	Disable this sequence.

MSI Reminds You...
Available settings for "First/Second/Third Boot Device" vary depending on the bootable devices you have installed. For example, if you did not install a floppy drive, the setting "Floppy" does not show up.

Boot Other Device
Setting the option to *Enabled* allows the system to try to boot from other devices if the system fails to boot from the 1st/2nd/3rd boot device.

Swap Floppy Drive
Setting to *Enabled* will swap floppy drives A: and B:.

Boot Up Floppy Seek
This setting causes the BIOS to search for floppy disk drives at boot time. When enabled, the BIOS will activate the floppy disk drives during the boot process: the drive activity light will come on and the head will move back and forth once. First A: will be done and then B: if it exists. Setting options: *Disabled, Enabled.*

Floppy Disk Access Control
This enables or disables the write protection for floppy drive. Settings: *R/W, Read Only*.

Boot Up NumLock Status
This setting is to set the Num Lock status when the system is powered on. Setting to *On* will turn on the Num Lock key when the system is powered on. Setting to *Off* will allow users to use the arrow keys on the numeric keypad. Setting options: *On, Off*.

Gate A20 Option
This item is to set the Gate A20 status. A20 refers to the first 64KB of extended memory. When the default value *Fast* is selected, the Gate A20 is controlled by Port92 or chipset specific method resulting in faster system performance. When *Normal* is selected, A20 is controlled by a keyboard controller or chipset hardware.

Typematic Rate Setting
This item is used to enable or disable the typematic rate setting including Typematic Rate & Typematic Delay.

Typematic Rate (Chars/Sec)
After *Typematic Rate Setting* is enabled, this item allows you to set the rate (characters/second) at which the keys are accelerated. Settings: *6, 8, 10, 12, 15, 20, 24* and *30*.

Typematic Delay (Msec)
This item allows you to select the delay between when the key was first pressed and when the acceleration begins. Settings: *250, 500, 750* and *1000*.

Security Option
This specifies the type of BIOS password protection that is implemented. Settings are described below:

Option	Description
Setup	The password prompt appears only when end users try to run Setup.
System	A password prompt appears every time when the computer is powered on or when end users try to run Setup.

MPS Version Control For OS
This field allows you to select which MPS (Multi-Processor Specification) version to be used for the operating system. You need to select the MPS version supported by your operating system. To find out which version to use, consult the vendor of your operating system. Settings: *1.4, 1.1*.

OS Select For DRAM > 64MB
This allows you to run the OS/2® operating system with DRAM larger than 64MB. When you choose *Non-OS2*, you cannot run the OS/2® operating system with DRAM larger than 64MB. But it is possible if you choose *OS2*.

Console Redirection
Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables/disables the operation of console redirection. When set to *Enabled*, BIOS redirects and sends all contents that should be displayed on the screen to the serial COM port for display on the terminal screen. Besides, all data received from the serial port is interpreted as keystrokes from a local keyboard. Setting options: *Enabled, Disabled*.

Baud Rate
This setting specifies the transfer rate (bits per second) of *Console Redirection*. Setting options: *9600, 19200, 38400, 57600, 115200*.

Agent Connect Via
To operate the system's console redirection, you need a terminal supporting ANSI terminal protocol and a RS-232 null modem cable connected between the host system and terminal(s). This field is a read-only field, which is used to indicate the type of device connected between the host system and terminal (s). NULL stands for a null modem.

Agent Wait Time (min)
This setting controls the timeout for terminals' (console redirection) connection to the host system. Setting options: *1, 2, 4, 8* (Min).

Agent After Boot
This setting determines whether or not to keep terminals' console redirection running after the OS has booted. Setting options: *Disabled, Enabled*.

Report No FDD For WIN 95
For compatibility with Windows 95 logo certification, select *Yes* to release

IRQ6 when the system contains no floppy drive. When this setting is set to *Yes*, users have to select *Disabled* for the *Onboard FDC Controller* in the Integrated Peripherals menu. Setting options: *Yes, No*.

Small Logo(EPA) Show
This setting enables you to show the EPA logo (brand specific graphics) on the bootup screen. Setting options:

Disabled	Shows the normal POST screen at boot.
Enabled	Shows a still image (EPA logo) on the screen at boot.

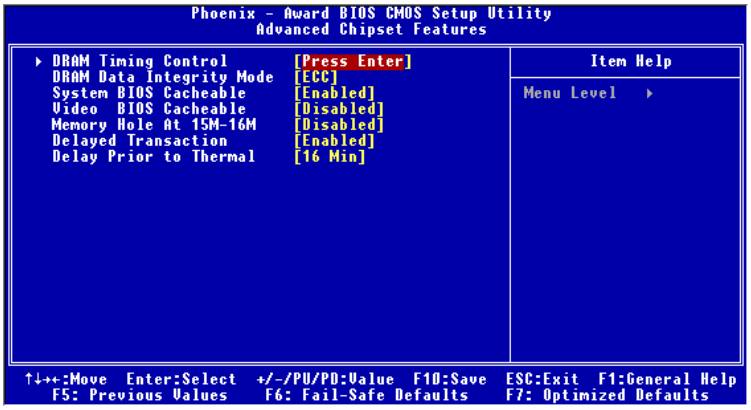
DMI Event Log
This setting disables/enables the BIOS to log DMI (Desktop Management Interface) events. Setting options: *Disabled, Enabled*.

Clear All DMI Event Log
When this setting is set to *Yes*, the DMI event log will be cleared at next POST stage. Then, the BIOS will automatically set this option to *No*. Setting options: *Yes, No*.

View DMI Event Log
Press *Enter* to view all DMI event logs.

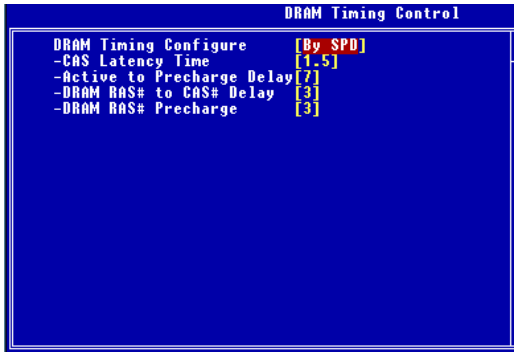
Mark DMI Events as Read
Press *Enter* and a screen pops up, asking users to confirm whether or not to clear all DMI event logs immediately. Press *Y* and *Enter*, the BIOS will clear all DMI event logs right away.

Advanced Chipset Features


Phoenix - Award BIOS CMOS Setup Utility
Advanced Chipset Features
DRAM Timing Control [Press Enter]
DRAM Data Integrity Mode [ECC]
System BIOS Cacheable [Enabled]
Video BIOS Cacheable [Disabled]
Memory Hole At 15M-16M [Disabled]
Delayed Transaction [Enabled]
Delay Prior to Thermal [16 Min]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

MSI Reminds You...
Change these settings only if you are familiar with the chipset.

DRAM Timing Control
Press <Enter> to enter the following sub-menu screen.


DRAM Timing Control
DRAM Timing Configure [By SPD]
-CAS Latency Time [1.5]
-Active to Precharge Delay [7]
-DRAM RAS# to CAS# Delay [3]
-DRAM RAS# Precharge [3]

DRAM Timing Configure
Selects whether DRAM timing is controlled by the SPD (Serial Presence Detect) EEPROM on the DRAM module. Setting to *By SPD* enables DRAM timing to be determined automatically by BIOS based on the con-

figurations on the SPD. Selecting *Manual* allows users to configure these fields manually.

--CAS Latency Time
This controls the timing delay (in clock cycles) before SDRAM starts a read command after receiving it. Settings: *1.5*, *2*, *2.5* (clocks). *1.5* (clocks) increases the system performance the most while *2.5* (clocks) provides the most stable performance.

--Active to Precharge Delay
The field specifies the idle cycles before precharging an idle bank. Settings: *7*, *6*, *5* (clocks).

--DRAM RAS# to CAS# Delay
This field allows you to set the number of cycles for a timing delay between the CAS and RAS strobe signals, used when DRAM is written to, read from or refreshed. Fast speed offers faster performance while slow speed offers more stable performance. Settings: *3*, *2* (clocks).

--DRAM RAS# Precharge
This item controls the number of cycles for Row Address Strobe (RAS) to be allowed to precharge. If insufficient time is allowed for the RAS to accumulate its charge before DRAM refresh, refresh may be incomplete and DRAM may fail to retain data. This item applies only when synchronous DRAM is installed in the system. Available settings: *3*, *2* (clocks).

DRAM Data Integrity Mode
Select *ECC* (Error-Correcting Code) or *Non-ECC* according to the type of installed DRAM.

System BIOS Cacheable
Selecting *Enabled* allows caching of the system BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result. Setting options: *Enabled, Disabled*.

Video BIOS Cacheable
Selecting *Enabled* allows caching of the video BIOS ROM at C0000h to C7FFFh, resulting in better video performance. However, if any program

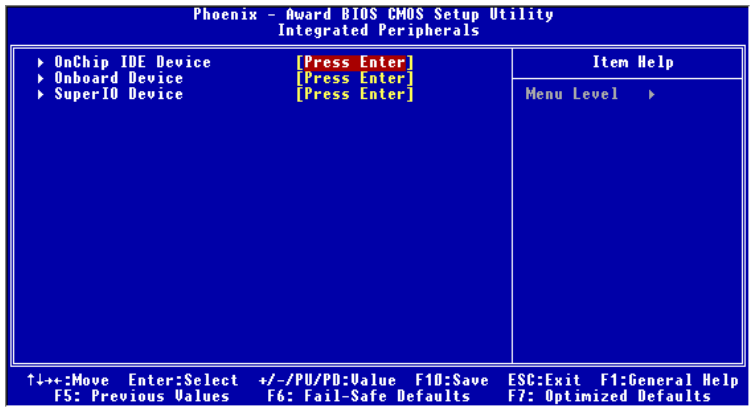
writes to this memory area, a system error may result. Setting options: *Enabled*, *Disabled*.

Memory Hole At 15M-16M
In order to improve performance, certain space in memory can be reserved for ISA peripherals. This memory must be mapped into the memory space below 16MB. When this area is reserved, it cannot be cached. Settings: *Enabled*, *Disabled*.

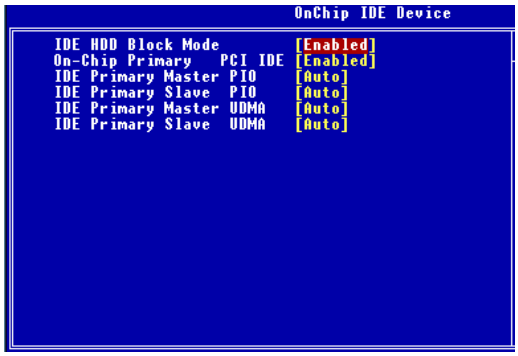
Delayed Transaction
The chipset has an embedded 32-bit posted write buffer to support delayed transactions cycles so that transactions to and from the ISA bus are buffered and PCI bus can perform other transactions while the ISA transaction is underway. Select *Enabled* to support compliance with PCI specification version 2.1. Setting options: *Enabled*, *Disabled*.

Delay Prior to Thermal
When the CPU temperature reaches a factory preset level, a thermal monitoring mechanism will be enabled following the appropriate timing delay specified in this field. With the thermal monitoring enabled, clock modulation controlled by the processor's internal thermal sensor is also activated to keep the processor within allowable temperature limit. Setting options: *4 Min*, *8 Min*, *16 Min*, *32 Min*.

Integrated Peripherals


Phoenix - Award BIOS CMOS Setup Utility
Integrated Peripherals
OnChip IDE Device [Press Enter]
Onboard Device [Press Enter]
SuperIO Device [Press Enter]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

OnChip IDE Device
Press <Enter> to enter the following sub-menu screen.


OnChip IDE Device
IDE HDD Block Mode [Enabled]
On-Chip Primary PCI IDE [Enabled]
IDE Primary Master PIO [Auto]
IDE Primary Slave PIO [Auto]
IDE Primary Master UDMA [Auto]
IDE Primary Slave UDMA [Auto]

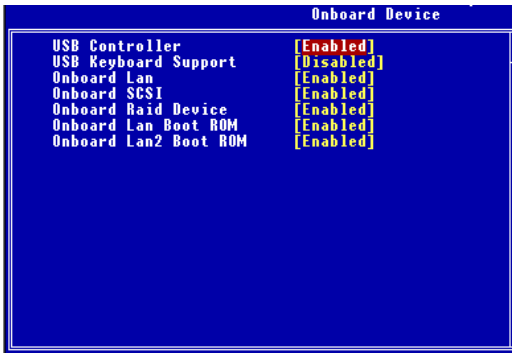
IDE HDD Block Mode
This allows your hard disk controller to use the fast block mode to transfer data to and from the hard disk drive. Block mode is also called block transfer, multiple commands or multiple sector read/write. *Enabled* enables IDE controller to use block mode; *Disabled* allows the controller to use standard mode.

On-Chip Primary PCI IDE
The integrated peripheral controller contains an IDE interface with support for two IDE channels. Choose *Enabled* to activate each channel separately.

IDE Primary Master/Slave PIO
The four items allow you to set a PIO (Programmed Input/Output) mode for each of the four IDE devices that the onboard IDE interface supports. *Modes 0~4* provide increased performance. In *Auto* mode, BIOS automatically determines the best mode for each IDE device.

IDE Primary Master/Slave UDMA
Ultra DMA implementation is possible only if your IDE device supports it and your operating environment contains a DMA driver. If both your hard drive and software support Ultra DMA 33 (or higher), select *Auto* to enable BIOS support.

Onboard Device
Press <Enter> to enter the following sub-menu screen.



USB Controller
Select *Enabled* if your system contains a Universal Serial Bus (USB) controller and you have USB peripherals. Setting options: *Enabled, Disabled*.

USB Keyboard Support
Set to *Enabled* if your need to use a USB-interfaced keyboard in the operating system that does not support or have any USB driver installed, such as DOS and SCO Unix.

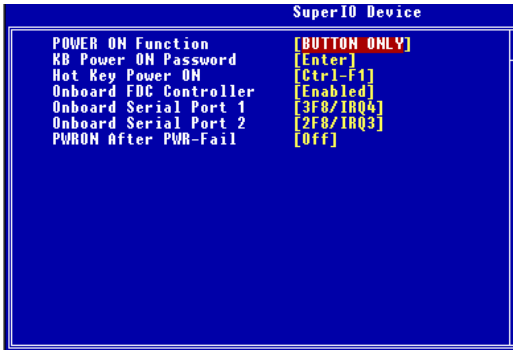
Onboard LAN
The field determines whether the onboard Giga-bit LAN controller is activated. Setting options: *Enabled*, *Disabled*.

Onboard SCSI
The field determines whether the onboard SCSI controller is activated. Setting options: *Enabled*, *Disabled*.

Onboard RAID Device
This setting controls the onboard RAID device. Setting options: *Enabled*, *Disabled*.

Onboard LAN/LAN2 Boot ROM
This setting enables/disables the initialization of the onboard LAN/LAN2 Boot ROM during bootup. Selecting *Disabled* will speed up the boot process.

Super IO Device
Press <Enter> to enter the following sub-menu screen.


SuperIO Device
POWER ON Function [BUTTON ONLY]
KB Power ON Password [Enter]
Hot Key Power ON [Ctrl-F1]
Onboard FDC Controller [Enabled]
Onboard Serial Port 1 [3F8/IRQ4]
Onboard Serial Port 2 [2F8/IRQ3]
PWRON After PWR-Fail [Off]

POWER ON Function
This setting controls which part on the PS/2 mouse or keyboard can power on the system. Settings: *Password*, *Hot KEY*, *Mouse Left*, *Mouse Right*, *Any Key*, *BUTTON ONLY* and *Keyboard 98*. Please note that this function only works under S3 mode.

KB Power ON Password
If *POWER ON Function i*s set to *Password*, then you can set a password in

the field for the PS/2 keyboard to power on the system. Please note that this function will only work under S3 mode.

Hot Key Power ON
If *POWER ON Function* is set to *Hot KEY*, you can assign a hot key combination in the field for the PS/2 keyboard to power on the system. Settings: *Ctrl-F1* through *Ctrl-F12*. Please note that this function will only work under S3 mode.

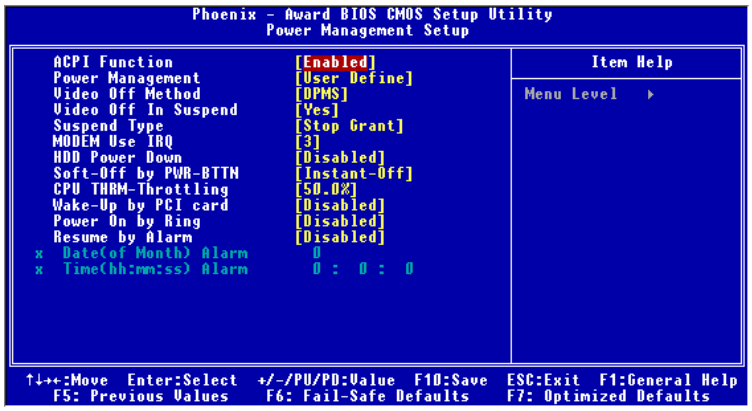
Onboard FDC Controller
The item is used to enable or disable the onboard Floppy controller. Select *Enabled* when you have installed a floppy disk drive and want to use it.

Onboard Serial Port 1/2
The items specify the base I/O port address and IRQ for the onboard Serial Port 1 (COM 1)/Serial Port 2 (COM 2). Selecting *Auto* allows BIOS to automatically determine the correct base I/O port address. Settings: *Disabled*, *3F8/IRQ4*, *2F8/IRQ3*, *3E8/IRQ4*, *2E8/IRQ3*, *Auto*.

PWRON After PWR-Fail
This setting specifies whether your system will reboot after a power failure or interrupts occurs. Available settings are:

Off	Leaves the computer in the power off state.
On	Reboots the computer.
Former-Sts	Restores the system to the status before power failure or interrupt occurs.

Power Management Setup


Phoenix - Award BIOS CMOS Setup Utility
Power Management Setup
ACPI Function [Enabled]
Power Management [User Define]
Video Off Method [DPMS]
Video Off In Suspend [Yes]
Suspend Type [Stop Grant]
MODEM Use IRQ [3]
HDD Power Down [Disabled]
Soft-Off by PWR-BTTN [Instant-Off]
CPU THRM-Throttling [50.0%]
Wake-Up by PCI card [Disabled]
Power On by Ring [Disabled]
Resume by Alarm [Disabled]
x Date(of Month) Alarm 0
x Time(hh:mm:ss) Alarm 0 : 0 : 0
Item Help
Menu Level ▸
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

MSI Reminds You...
S3-related functions described in this section are available only when your BIOS supports S3 sleep mode.

ACPI Function
This item is to activate the ACPI (Advanced Configuration and Power Management Interface) function. If your operating system is ACPI-aware, such as Windows 98SE/2000/ME, select *Enabled*. Setting options: *Enabled*, *Disabled*.

Power Management
This item is used to select the degree (or type) of power saving and is related to these modes: *Suspend Mode* and *HDD Power Down*. There are three options for power management:

Min Saving	Minimum Power Management. Suspend Mode = 1 Hour.
Max Saving	Maximum Power Management. Suspend Mode = 1 Min.
User Define	Allows end users to configure each mode separately.

Video Off Method
This determines the manner in which the monitor is blanked.

V/H SYNC+Blank	This selection will cause the system to turn off

	the vertical and horizontal synchronization ports and write blanks to the video buffer.
Blank Screen	This option only writes blanks to the video buffer.
DPMS	Initial display power management signaling.

Video Off In Suspend
This setting determines whether the monitor will be turned off during suspend mode. Setting options: *Yes, No*.

Modem Use IRQ
Name the interrupt request (IRQ) line assigned to the modem (if any) on your system. Activity of the selected IRQ always awakens the system. Settings are *3, 4, 5, 7, 9, 10, 11* and *NA*.

Suspend Mode
If system activity is not detected for the length of time specified in this field, all devices except CPU will be shut off. Settings are *Disabled, 1 Min, 2 Min, 4 Min, 8 Min, 12 Min, 20 Min, 30 Min, 40 Min* and *1 Hour*.

HDD Power Down
When enabled and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active. The settings are: *Disable, 1~15 Min.*

Soft-Off by PWR-BTTN
This feature allows users to configure the power button function. Settings are:

Instant-Off	The power button functions as a normal power-on/-off button.
Delay 4 Sec.	When you press the power button, the computer enters the suspend/sleep mode, but if the button is pressed for more than four seconds, the computer is turned off.

CPU THRM-Throttling
The item allows you to specify the CPU speed (at percentage) to which it will slow down when the CPU reaches the predetermined overheat temperature. Settings range from *12.5%* to *87.5%* at 12.5% increment.

Wake-Up by PCI Card, Power On by Ring
These fields specify whether the system will be awakened from power saving

modes when activity or input signal of the specified hardware peripheral or component is detected.

Resume By Alarm
The field is used to enable or disable the feature of booting up the system on a scheduled time/date.

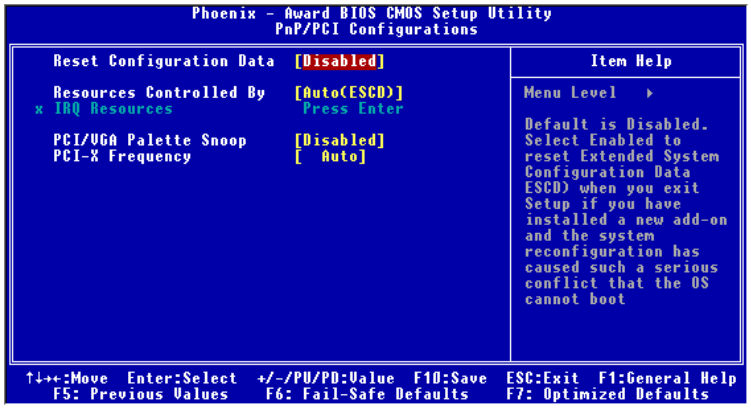
Date (of Month) Alarm
The field specifies the date for *Resume by Alarm*. Settings: 0~31.

Time (hh:mm:ss) Alarm
The field specifies the time for *Resume by Alarm. F*ormat is <hour> <minute><second>.

MSI Reminds You...
If you have changed this setting, you must let the system boot up until it enters the operating system, before this function will work.

PNP/PCI Configurations

This section describes configuring the PCI bus system and PnP (Plug & Play) feature. PCI, or **P**eripheral **C**omponent **I**nterconnect, is a system which allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its special components. This section covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.


Phoenix - Award BIOS CMOS Setup Utility
PnP/PCI Configurations
Reset Configuration Data [Disabled]
Resources Controlled By [Auto(ESCD)]
x IRQ Resources Press Enter
PCI/VGA Palette Snoop [Disabled]
PCI-X Frequency [Auto]
Item Help
Menu Level ▸
Default is Disabled. Select Enabled to reset Extended System Configuration Data ESCD) when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the OS cannot boot
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Reset Configuration Data

Normally, you leave this field *Disabled*. Select *Enabled* to reset Extended System Configuration Data (ESCD) when you exit Setup if you have installed a new add-on card and the system reconfiguration has caused such a serious conflict that the operating system cannot boot. Setting options: *Enabled*, *Disabled*.

Resource Controlled By

The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely nothing unless you are using a Plug and Play operating system such as Windows® 95/98. If you set this field to “manual” choose specific resources by going into each of the sub menu that follows this field (a sub menu is preceded by a “➢”). The settings are: *Auto (ESCD)*, *Manual*.

IRQ Resources
The items are adjustable only when *Resources Controlled By* is set to *Manual*. Press <Enter> and you will enter the sub-menu of the items. IRQ Resources list IRQ 3/4/5/7/9/10/11/12/14/15 for users to set each IRQ a type depending on the type of device using the IRQ. Settings are:

PCI Device	For Plug & Play compatible devices designed for PCI bus architecture.
Reserved	The IRQ will be reserved for further request.

PCI/VGA Palette Snoop
When set to *Enabled*, multiple VGA devices operating on different buses can handle data from the CPU on each set of palette registers on every video device. Bit 5 of the command register in the PCI device configuration space is the VGA Palette Snoop bit (0 is disabled). For example, if there are two VGA devices in the computer (one PCI and one ISA) and the:

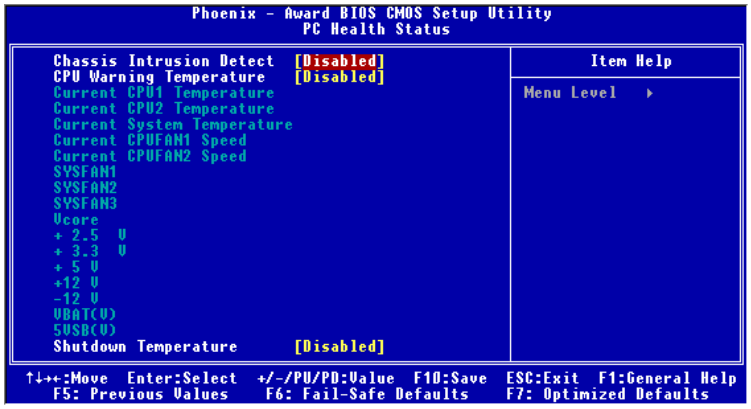
VGA Palette Snoop Bit Setting	**Action**
Disabled	Data read or written by the CPU is only directed to the PCI VGA device's palette registers.
Enabled	Data read or written by the CPU is directed to both the PCI VGA device's palette registers and the ISA VGA device's palette registers, permitting the palette registers of both VGA devices to be identical.

The setting must be set to *Enabled* if any ISA bus adapter in the system requires VGA palette snooping.

PCI-X Frequency
This setting is used to set the frequency of the onboard 64-bit PCI-X bus slots. Setting options: *Auto, 33MHz, 66MHz, 100MHz, 133MHz*.

PC Health Status

This setup screen shows the status of your CPU, fan, overall system status,.. etc. Monitor function is available only if there is hardware monitoring mechanism onboard.



Chassis Intrusion Detect
The field enables or disables the feature of recording the chassis intrusion status and issuing a warning message if the chassis is once opened. To clear the warning message, set the field to *Reset*. The setting of the field will automatically return to *Enabled* later. Settings: *Enabled*, *Reset*, *Disabled*.

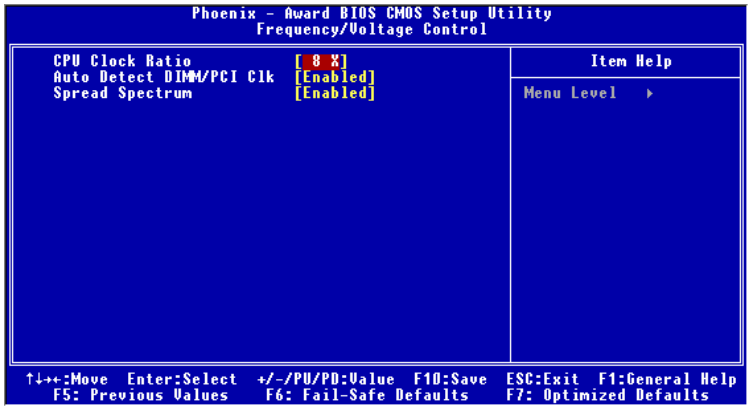
CPU Warning Temperature
If the CPU temperature reaches the upper limit preset in this setting, the warning mechanism will be activated. This helps you to prevent the CPU overheat problem.

Current CPU1/CPU2/System Temperature, Current CPUFAN1/2 Speed, SYSFAN1/2/3, Vcore, +2.5 (V), +3.3 (V), +5V, +12V, -12V, -5V, VBAT (V), 5VSB (V)
These items display the current status of all of the monitored hardware devices/components such as CPU voltages, temperatures and all fans' speeds.

Shutdown Temperature
This option is for setting the shutdown temperature level for the processor. When the processor reaches the temperature you set, the system will be shut down.

Frequency/Voltage Control

Use this menu to specify your settings for frequency/voltage control.


Phoenix - Award BIOS CMOS Setup Utility
Frequency/Voltage Control
CPU Clock Ratio [8 X]
Auto Detect DIMM/PCI Clk [Enabled]
Spread Spectrum [Enabled]
Item Help
Menu Level
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

CPU Clock Ratio
This setting controls the multiplier that is used to determine the internal clock speed of the processor for overclocking purposes.

Auto Detect DIMM/PCI Clk
This item is used to auto detect the DIMM/PCI slots. When set to *Enabled*, the system will remove (turn off) clocks from empty DIMM/PCI slots to minimize the electromagnetic interference (EMI). Setting options: *Enabled, Disabled*.

Spread Spectrum
When the motherboard's clock generator pulses, the extreme values (spikes) of the pulses creates EMI (Electromagnetic Interference). The Spread Spectrum function reduces the EMI generated by modulating the pulses so that the spikes of the pulses are reduced to flatter curves. If you do not have any EMI problem, leave the setting at *Disabled* for optimal system stability and performance. But if you are plagued by EMI, setting to *Enabled* for EMI reduction. Remember to disable Spread Spectrum if you are overclocking because even a slight jitter can introduce a temporary boost in clockspeed which may just cause your overclocked processor to lock up.

Load Fail-Safe/Optimized Defaults

The two options on the main menu allow users to restore all of the BIOS settings to the default Fail-Safe or Optimized values. The Optimized Defaults are the default values set by the mainboard manufacturer specifically for optimal performance of the mainboard. The Fail-Safe Defaults are the default values set by the BIOS vendor for stable system performance.

When you select *Load Fail-Safe Defaults*, a message as below appears:

Pressing *Y* loads the BIOS default values for the most stable, minimal system performance.

When you select *Load Optimized Defaults*, a message as below appears:

Pressing *Y* loads the default factory settings for optimal system performance.

Set Supervisor/User Password

When you select this function, a message as below will appear on the screen:

Type the password, up to six characters in length, and press <Enter>. The password typed now will replace any previously set password from CMOS memory. You will be prompted to confirm the password. Retype the password and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To clear a set password, just press <Enter> when you are prompted to enter the password. A message will show up confirming the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup without entering any password.

When a password has been set, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also have Award BIOS to request a password each time the system is booted. This would prevent unauthorized use of your computer. The setting to determine when the password prompt is required is the *Security Option* of the *ADVANCED BIOS FEATURES* menu. If the *Security Option* is set to *System*, the password is required both at boot and at entry to Setup. If set to *Setup*, password prompt only occurs when you try to enter Setup.

MSI Reminds You...

About Supervisor Password & User Password:

Supervisor password:	*Can enter and change the settings of the setup menu.*
User password:	*Can only enter but do not have the right to change the settings of the setup menu.*

SCSI BIOS Setup (Optional)

This chapter provides information on the Small Computer System Interface (SCSI) BIOS setup utility and allows you to configure the SCSI subsystem for optimum use.

You may need to run the SCSI BIOS setup utility when:

- You want to change the default SCSI controller settings for customized features.
- You intend to manage any of the attached SCSI devices.

Entering SCSI BIOS

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <Ctrl> + <A> keys simultaneously to enter SCSI BIOS utility.

◁◁◁ Press <Ctrl><A> for SCSISelect(TM) Utility ▷▷▷

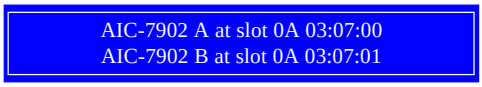
Control Keys

Use the following keys to navigate the SCSI BIOS menu items.

<↑> <↓> <←> <→>	Move between different items
<Enter>	Select the item or show the options of the selected item
<Esc>	Exit the menu or return to the main menu from a submenu
<F6>	Restore the default SCSI values

Selecting the SCSI Channel

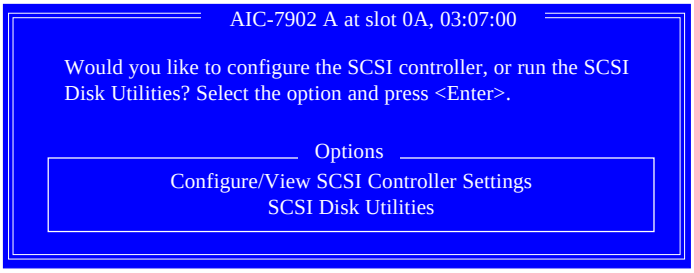
After entering the SCSI BIOS by pressing the <Ctrl> + <A> key combination, you will see the following menu appear on the screen.



Each item represents one SCSI channel (connector). The mainboard offers dual onboard SCSI channels: channel A & channel B. Move the cursor to the desired channel and then press <Enter>.

Selecting the Management Type

The following screen will appear after you select the SCSI channel you intend to manage. The menu will list two categories for you to choose what to do with the SCSI channel. Move the cursor to the desired function and press <Enter>.

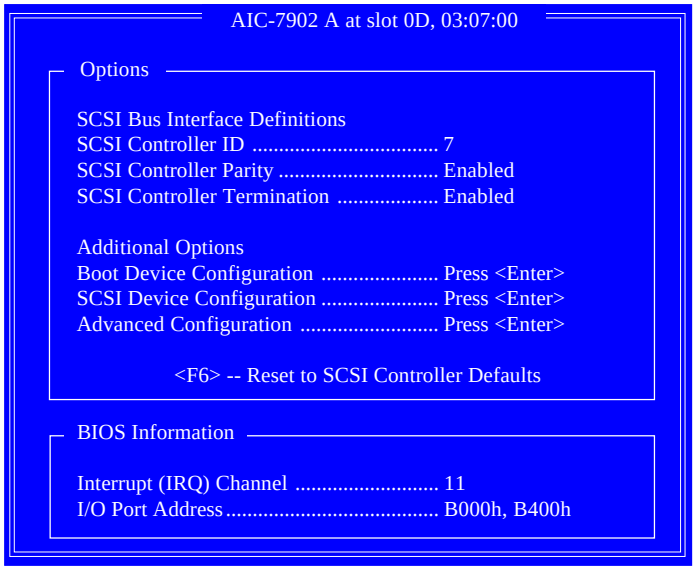

AIC-7902 A at slot 0A, 03:07:00
Would you like to configure the SCSI controller, or run the SCSI Disk Utilities? Select the option and press <Enter>.
Options
Configure/View SCSI Controller Settings
SCSI Disk Utilities

Configure/View SCSI Controller Settings
Use this option for SCSI controller configurations.

SCSI Disk Utilities
Use this option to manage the attached SCSI device.

Configure/View SCSI Controller Settings

There are 8 items in the “Configure/View SCSI Controller Settings” screen. These items display or allow you to change the SCSI controller’s settings. Use the arrow keys to highlight the item and then press <Enter> to select the value you want in each item or enter each item’s sub-menu screen.


AIC-7902 A at slot 0D, 03:07:00
Options
SCSI Bus Interface Definitions
SCSI Controller ID 7
SCSI Controller Parity ..... Enabled
SCSI Controller Termination ..... Enabled
Additional Options
Boot Device Configuration ..... Press <Enter>
SCSI Device Configuration ..... Press <Enter>
Advanced Configuration ..... Press <Enter>
<F6> -- Reset to SCSI Controller Defaults
BIOS Information
Interrupt (IRQ) Channel 11
I/O Port Address B000h, B400h

SCSI Bus Interface Definitions

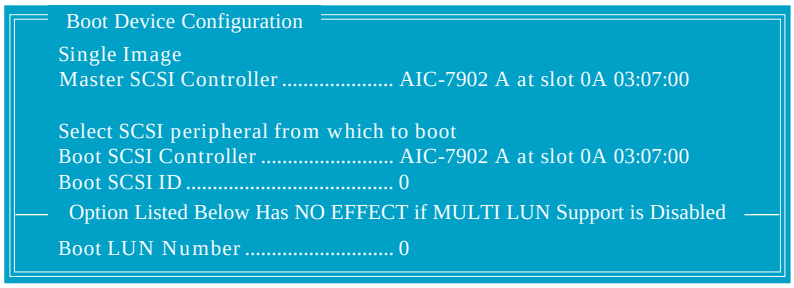
SCSI Controller ID
The item is used to assign a SCSI ID to the SCSI controller. It is recommended that you should leave the default setting unchanged. Settings: *0~15*.

SCSI Controller Parity
Use the field to enable or disable SCSI parity error checking function. If any of your SCSI devices does not support parity checking, disable this function. While disabling the function, you should disable disconnections for all devices, as parity checking for the reselection phase is NOT disabled. A non-parity device’s I/O operation will never complete if the reselection fails due to a parity error.

SCSI Controller Termination
In order to have the SCSI bus function properly and reliably, termination at the ends of the SCSI bus is necessary. Proper termination can ensure signal on the SCSI bus will not reflect and cause data loss or errors. Settings options: *Enabled*, *Disabled*.

Additional Options

Boot Device Configuration
Press <Enter> to enter the sub-menu screen.


Boot Device Configuration
Single Image
Master SCSI Controller ..... AIC-7902 A at slot 0A 03:07:00
Select SCSI peripheral from which to boot
Boot SCSI Controller ..... AIC-7902 A at slot 0A 03:07:00
Boot SCSI ID 0
Option Listed Below Has NO EFFECT if MULTI LUN Support is Disabled
Boot LUN Number 0

Boot SCSI Controllers
Select either SCSI channel A (AIC-7902 A) or channel B (AIC-7902 B) to boot up the SCSI subsystem.

Boot SCSI ID
Specify a SCSI device to become the boot device by selecting its SCSI ID. Setting options: *0~15*.

Boot LUN Number
If a boot device has multiple logical units, you must specify the boot logical unit number (LUN). If multiple LUN support is disabled, specifying a number here is useless. Setting options: *0~7*.

SCSI Device Configuration
Press <Enter> and the following sub-menu screen appears. The sub-menu screen allows you to specify the configuration for each device on the SCSI bus.

SCSI Device Configuration

SCSI Device ID	#0	#1	#2	#3	#4	#5	#6	#7
Sync Transfer Rate (MB/Sec)	320	320	320	320	320	320	320	320
Packetized	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
QAS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initiate Wide Negotiation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enable Disconnection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Send Start Unit Command	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BIOS Multiple LUN Support	No	No	No	No	No	No	No	No
Include in BIOS Scan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

SCSI Device ID	#8	#9	#10	#11	#12	#13	#14	#15
Sync Transfer Rate (MB/Sec)	320	320	320	320	320	320	320	320
Packetized	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
QAS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initiate Wide Negotiation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enable Disconnection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Send Start Unit Command	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BIOS Multiple LUN Support	No	No	No	No	No	No	No	No
Include in BIOS Scan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sync Transfer Rate (MB/Sec)
The field allows you to specify the maximum synchronous data transfer rate depending on the type of each SCSI device. Select *ASYN* to enable asynchronous negotiation for some older SCSI devices.

Packetized
When enabled, this option is supported by the device drivers. However, this option is not supported by the BIOS.

QAS
When enabled, this option is supported by the device drivers. However, this option is not supported by the BIOS.

Initiate Wide Negotiation
When set to *Yes*, the field allows wide SCSI hard drives to use 16-bit (2 bytes) transfers.

Enable Disconnection
This field tells the SCSI controller whether or not to allow the specified

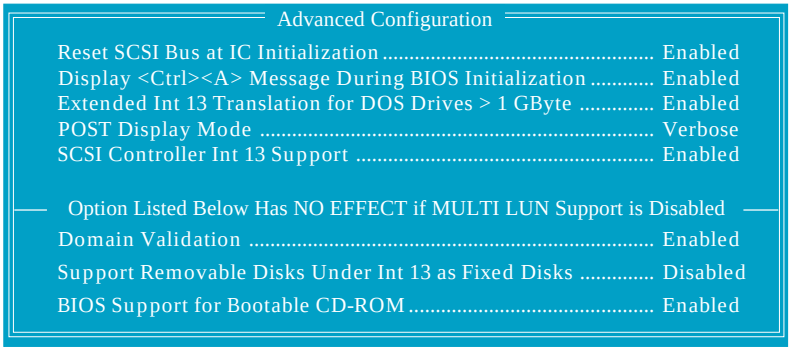
SCSI device to disconnect during an I/O transfer operation. The disconnection ability frees the SCSI bus to allow other I/O processes and thus optimizes the SCSI bus performance. Setting options: *Yes, No*.

Send Start Unit Command
When set to *Yes*, the SCSI controller sends the Start Unit command to the specified SCSI device during bootup. The interface powers up the SCSI device on-at-a-time during bootup, reducing the load on the computer's power supply. Setting options: *Yes, No*.

BIOS Multiple LUN Support
Select *Yes* when any SCSI device has multiple logical units. Setting options: *Yes, No*.

Include in BIOS Scan
Selecting *Yes* allows the SCSI controller to control the SCSI device with its SCSI ID. When set to *No*, the SCSI controller does not control the specified SCSI device by not scanning for the SCSI ID during bootup, but the boot time will be decreased. Setting options: *Yes, No*.

Advanced Configuration
Press <Enter> to enter the sub-menu screen for advanced configuration.


Advanced Configuration
Reset SCSI Bus at IC Initialization ..... Enabled
Display <Ctrl><A> Message During BIOS Initialization ..... Enabled
Extended Int 13 Translation for DOS Drives > 1 GByte ..... Enabled
POST Display Mode ..... Verbose
SCSI Controller Int 13 Support ..... Enabled
Option Listed Below Has NO EFFECT if MULTI LUN Support is Disabled
Domain Validation ..... Enabled
Support Removable Disks Under Int 13 as Fixed Disks ..... Disabled
BIOS Support for Bootable CD-ROM ..... Enabled

Reset SCSI Bus at IC Initialization
Selecting *Enabled* will reset the SCSI bus the first time the SCSI controller is initialized. Setting options: *Enabled, Disabled*.

Display <Ctrl><A> Message During BIOS Initialization
When enabled, the message "Press <Ctrl><A> for SCSISelect(TM) Utility" appears on the screen during bootup. If disabled, the message does not show up, but you can still press <Ctrl> + <A> key combination to enter the SCSI BIOS utility. Setting options: *Enabled, Disabled*.

Extended Int 13 Translation for DOS Drives > 1 GByte
The field allows SCSI hard disk drives greater than 1 GB to use a translation scheme of 255 heads, 63 sectors per track. Setting options: *Enabled, Disabled*.

POST Display Mode
The field determines how much information about your SCSI controller and devices appear on the screen during bootup. For the most complete information, choose *Diagnostic*. For a faster boot, select *Silent*. Setting options: *Verbose, Silent, Diagnostic*.

SCSI Controller Int 13 Support
The field allows you to enable or disable the support for Int 13h. The software interrupt "Int 13h" is the interface through which the operating system or application is able to pass commands to hard disk drives, such as reading, writing and formatting. Setting options: *Enabled, Disabled: NOT scan, Disabled: scan bus*.

Domain Validation
When enabled, these options are available if they are implemented in the device drivers. However, this option is not supported by the BIOS.

Support Removable Disks Under Int13 as Fixed Disks
When *Boot Only* is selected, only the removable media drive designated as the boot device will be treated as a hard disk drive. When *All Disks* is selected, all removable media drives supported by the BIOS are treated as hard disk drives. If selecting *Disabled*, no removable media drive is treated as a hard disk drive and the removable media drives must be controlled by the OS drivers.

BIOS Support for Bootable CD-ROM
When enabled, the SCSI controller BIOS supports bootable CD-ROM under the El Torito specification. If booting from a hard disk or other

device, make sure no bootable CD-ROM is inserted or disable this option.

BIOS Information

Interrupt (IRQ) Channel
Displays the IRQ line assigned to the SCSI channel.

I/O Port Address
Displays the I/O port address assigned to the SCSI channel.

Disk Utilities

AIC-7902 A at slot 0A, 03:07:00

Select SCSI Disk and press <Enter>

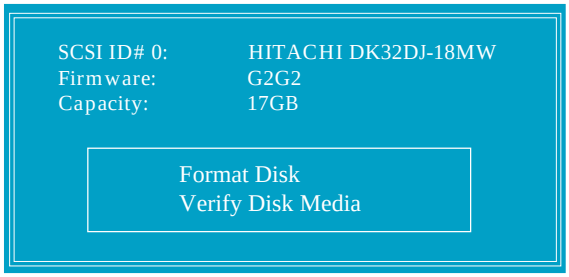
SCSI ID#0:	No device
SCSI ID#1:	No device
SCSI ID#2:	No device
SCSI ID#3:	No device
SCSI ID#4:	No device
SCSI ID#5:	No device
SCSI ID#6:	No device
SCSI ID#7:	Adaptec AIC-7902
SCSI ID#8:	No device
SCSI ID#9:	No device
SCSI ID#10:	No device
SCSI ID#11:	No device
SCSI ID#12:	No device
SCSI ID#13:	No device
SCSI ID#14:	No device
SCSI ID#15:	No device

AIC-7902 B at slot 0A, 03:07:00

Select SCSI Disk and press <Enter>

SCSI ID#0:	HITACHI DK32DJ-18MW
SCSI ID#1:	No device
SCSI ID#2:	No device
SCSI ID#3:	No device
SCSI ID#4:	No device
SCSI ID#5:	No device
SCSI ID#6:	No device
SCSI ID#7:	Adaptec AIC-7902
SCSI ID#8:	No device
SCSI ID#9:	No device
SCSI ID#10:	No device
SCSI ID#11:	No device
SCSI ID#12:	No device
SCSI ID#13:	No device
SCSI ID#14:	No device
SCSI ID#15:	No device

Select the SCSI device which you want to manage by highlighting the item and press <Enter>. The following dialog box appears. Select the function you want to perform.



Format Disk
The utility performs low-level formatting of a hard disk drive. The function might take several hours to complete.

Verify Disk Media
This utility verifies that the drive is functioning properly. Verifying function will scan for media defects on the disk.

Troubleshooting

Q: Where can I find the model number of the mainboard?

A: There are two places where you can find the model number of the mainboard: 1. Somewhere between the PCI slots you shall find MS-xxxx or the marketing name like “K7T Turbo”. You can also find the version number beside it. 2. At the back cover of the user's manual.

Q: What do you mean by PCB version 1?

A: PCB is printed circuit board. Saying PCB version 1 is the same as saying motherboard version 1.

Q: Why is my motherboard BIOS sticker "Phoenix BIOS" while I see "Award BIOS" during system boot-up?

A: Phoenix & Award already merged as one company. All MSI motherboards using Award BIOS come with Phoenix logo stickers.

Q: How do I know what MSI D-LED or D-bracket light mean?

A: Please follow the special tech issue, http://www.msi.com.tw/support/techexpress/special_tech/smartled.htm

Q: I used my MSI motherboard and got an error message, "Primary IDE Channel No 80 Conductor Cable Installed" while the system detected hard drives.

A: This is not a problem. It merely means that you're using an ATA-66 or ATA-100 HDD, but you're using the conductor 40 ATA-33 cable.

Q: I have high speed CPU cooling fan like Taisol CGK760092, Vantec CCK-6035D & GlobalWin WBK38. Can I install the fan directly to the motherboard?

A: We strongly recommend that you do NOT connect those described CPU fan directly to your motherboard, as it draws so much power, that it could damage it. Please use a 3-Pin to 4-Pin Cable that comes together with the fan.

Q: Can I use more than 512MB memory on Win9x or WinME?

A: No, you can't. You can only use more than 512MB memory on Win2000 or WinXP. This is a Microsoft OS issue. Please check http://support/microsoft.com/support/kb/articles/Q108/0/79.ASP

Q: I have tried to download the MSI Live Update utility from http://www.msi.com.tw/support/liveupdate/livedriver.htm but it keeps on failing?

A: This can be solved by one of the following suggestions: 1. Dont install zonealarm 2. Disable "WebTrap" of PC-cillion 2000 3. Disable any web based anti-virus Software.

Q: Can Live Update Series support WinXP?

A: Live Update Series version 215 can support WinXP. Download it from http://www.msi.com.tw/support/liveupdate/livedriver.htm

Q: After flashing the BIOS, my system for unknown reason fails to boot. What should I do?

A: Please refer to the following suggestions: 1. Try the BIOS boot recovery feature as described in http://www.msi.com.tw/support/bios/boot.htm 2. Try to clear the CMOS If problem still persists, ask your reseller for new BIOS chip or contact one of MSI office near your place for new BIOS chip http://www.msi.com.tw/contact/main.htm

Q: Should I update my BIOS, once a new BIOS is released?

A: A new BIOS is usually released due to the following reasons:

1. New function is supported

2. New BIOS source code
3. Bugs are found
4. Customer-specific request

When we release a new BIOS, there's usually a release note attached which lists the reason for the release. Refer to this release note and decide for yourself if upgrading to the new BIOS will be worth it. A word of advice, though, do not upgrade to the new BIOS, unless you really have to.

Q: How do I update the BIOS?

A: Please refer to http://www.msi.com.tw/support/bios/note.htm for details.

Q: How do I identify the BIOS version?

A: Upon boot-up, the 1st line appearing after the memory count is the BIOS version. It is usually in the format:

1. For older model number:

AG76 091096 where:

1st digit refers to BIOS maker as A = AMI(R) W = AWARD(R) P = PHOENIX (R).

2nd digit refers to the internal chipset code.

3rd digit refers to the processor class as 5 = 486, 7 = 586, 8 = 686.

4th digit is incremental.

091096 refers to the date this BIOS is released.

2. For newer model number:

W5139MS V1.0 091096 where:

1st digit refers to BIOS maker as A = AMI(R) W = AWARD(R) P = PHOENIX (R).

2nd - 5th digit refers to the model number.

6th - 7th digit refers to the customer as MS = all standard customers.

V1.0 refers to the BIOS version.

091096 refers to the date this BIOS is released.

Q: After I flashed the BIOS and rebooted the system, the screen went blank.

A: ***For AMI BIOS***

Rename the desired AMI BIOS file to AMIBOOT.ROM and save it on a floppy disk. e.g. Rename A569MS23.ROM to AMIBOOT.ROM

Insert this floppy disk in the floppy drive. Turn On the system and press and hold Ctrl-Home to force update. It will read the AMIBOOT.ROM file and recover the BIOS from the A drive.

When 4 beeps are heard you may remove the floppy disk and restart the computer.

For Award BIOS

Make a bootable floopy disk

Copy the Award flash utility & BIOS file to the said floppy disk

Create an autoexec.bat with "awdfl535 biosfilename" in the content e.g. awdfl535a619mj21.bin

Boot up system with the said floppy (it will take less than 2 minutes before screen comes out)

Re-flash the BIOS & reboot.

Glossary

ACPI *(Advanced Configuration & Power Interface)*
This power management specification enables the OS (operating system) to control the amount of power given to each device attached to the computer. Windows 98/98SE, Windows 2000 and Windows ME can fully support ACPI to allow users managing the system power flexibly.

AGP *(Accelerated Graphics Port)*
A new, high-speed graphics interface that based on PCI construction and designed especially for the throughput demands of 3-D graphics. AGP provides a direct channel (32-bit wide bus) between the display controller and main memory for high graphics quality and performance.

Bluetooth
Bluetooth refers to a worldwide standard for the wireless exchange of data between two devices. Bluetooth requires that a low-cost transceiver chip be included in each device. The tranceiver transmits and receives in a previously unused frequency band of 2.45 GHz that is available globally (with some variation of bandwidth in different countries). In addition to data, up to three voice channels are available. Each device has a unique 48-bit address from the IEEE 802 standard. Connections can be point-to-point or multipoint. The maximum range is 10 meters. Data can be exchanged at a rate of 1 megabit per second (up to 2 Mbps in the second generation of the technology).

BIOS *(Basic Input/Output System)*
On PCs, an essential software that contains all the control code of input/output interface (such as keyboard, disk drives, etc.). It executes hardware test on booting the system, starts the OS, and provides an interface between the OS and the components. The BIOS is stored in a ROM chip.

Bus
A set of hardware lines within the computer system, through which the data is transferred among different components. In a PC, the term ***bus*** usually refers to a local bus that connects the internal components to the CPU and main memory.

Cache
A special memory subsystem that is used to speed up the data transfer. It stores the

contents of frequently accessed RAM locations and the addresses where these data items are stored.

Chipset
A collection of integrated chips designed to perform one or more related functions. For example, a modem chipset contains all the primary circuits for transmitting and receiving data; a PC chipset provides the electronic interfaces between all subsystems.

Clock Cycle
Clock cycle (or tick) is the smallest unit of time recognized by a device. For personal computers, clock cycles generally refer to the main system clock, which runs at 66 MHz. This means that there are 66 million clock cycles per second. Since modern CPUs run much faster (up to 533 MHz), the CPU can execute several instructions in a single clock tick.

CMOS *(Complementary Metal-Oxide Semiconductor)*
CMOS is a widely used type of semiconductor, which features high speed and low power consumption. PCs usually contain a small amount of battery-powered CMOS memory to retain the date, time, and system setup parameters.

DRAM *(Dynamic RAM)*
A most common type of computer memory. It usually uses one transistor and a capacitor to represent a bit. As the development of technology, the memory type and specification used in computer becomes variety, such as SDRAM, DDR SDRAM, and RDRAM. For further instruction, please see the table below:

Dynamic RAM (DRAM) Memory Technologies

Type	First Used	Clock Rate	Bus* Width	Peak Bandwidth	Volts
FPM (60,70ns)	1990	25MHz	64 bits	200 MBps	5v
EDO (50,60,70ns)	1994	40MHz	64 bits	320 MBps	5v
SDRAM (66MHz)	1996	66MHz	64 bits	528 MBps	3.3v
SDRAM (100MHz)	1998	100MHz	64 bits	800 MBps	3.3v
SDRAM (133MHz)	1999	133MHz	64 bits	1.1 GBps	3.3v
RDRAM (Direct Rambus)	1999	400MHz	16 bits	1.6 GBps	2.5v
DDR SDRAM (100MHz)	2000	100MHz	64 bits	1.6 GBps	3.3v
DDR SDRAM (133MHz)	2000	133MHz	64 bits	2.1 GBps	3.3v

* Memory channel width (64 bits started with 75MHz Pentium)

Source: Computer Desktop Encyclopedia

ECC Memory *(Error Correcting Code Memory)*
A type of memory that contains special circuitry for testing the accuracy of data and correcting the errors on the fly.

EEPROM
Acronym for Electrically Erasable Programmable Read-Only Memory. An EEPROM is a special type of PROM that can be erased by exposing it to an electrical charge. Like other types of PROM, EEPROM retains its contents even when the power is turned off. Also like other types of ROM, EEPROM is not as fast as RAM. EEPROM is similar to flash memory (sometimes called flash EEPROM). The principal difference is that EEPROM requires data to be written or erased one byte at a time whereas flash memory allows data to be written or erased in blocks. This makes flash memory faster.

EIDE
Short for Enhanced IDE, a newer version of the IDE mass storage device interface standard developed by Western Digital Corporation. It supports data rates of between 4 and 16.6 MBps, about three to four times faster than the old IDE standard. In addition, it can support mass storage devices of up to 8.4 gigabytes, whereas the old standard was limited to 528 MB. Because of its lower cost, enhanced EIDE has replaced SCSI in many areas. There are four EIDE modes defined. The most common is Mode 4, which supports transfer rates of 16.6 MBps. There is also a new mode, called ATA-3 or Ultra ATA, that supports transfer rates of 33 MBps.

EISA *(Extended Industry Standard Architecture)*
EISA is a standard bus (computer interconnection) architecture that extends the ISA standard to a 32-bit interface. It was developed in part as an open alternative to the proprietary Micro Channel Architecture (MCA) that IBM introduced in its PS/2 computers. EISA data transfer can reach a peak of 33 megabytes per second.

ESCD *(Extended System Configuration Data)*
It is a format for storing information about Plug-and-Play (PnP) devices in the BIOS. Windows and the BIOS access the ESCD area each time you re-boot your computer

External Cache
Short for Level 2 cache, cache memory that is external to the microprocessor. In general, L2 cache memory, also called the secondary cache, resides on a separate chip from the microprocessor chip. Although, more and more microprocessors are including L2 caches into their architectures.

IDE *(Integrated Drive Electronics)*
A type of disk-drive interface widely used to connect hard disks, CD-ROMs and tape drives to a PC, in which the controller electronics is integrated into the drive itself, eliminating the need for a separate adapter card. The IDE interface is known as the ATA (AT Attachment) specification.

IEEE 1394
A new, high speed external bus standard, also known as ***FireWire*** or ***iLink***, which supports data transfer rates of up to 400 Mbps for connecting up to 63 external devices.

Internal Cache
Short for Level 1 cache, a memory cache built into the microprocessor. The L1 cache is also called the primary cache.

IrDA *(Infrared Data Association)*
A group of device vendors, including computer, component and telecommunications, who have developed a standard for transmitting data via infrared light waves. This enables you to transfer data from one device to another without any cables.

IRQ *(Interrupt Request Line)*
IRQs are hardware lines over which devices can send interrupt signals to the microprocessor. When you add a new device to a PC, you sometimes need to set its IRQ number by setting a DIP switch. This specifies which interrupt line the device may use. IRQ conflicts used to be a common problem when adding expansion boards, but the Plug-and-Play specification has removed this headache in most cases.

ISA *(Industry Standard Architecture)*
ISA is a standard bus (computer interconnection) architecture that is associated with the IBM AT motherboard. It allows 16 bits at a time to flow between the motherboard circuitry and an expansion slot card and its associated device(s). Also see EISA and MCA.

LAN *(Local Area Network)*
A computer network that covers a relatively smaller area, such as in a building or an enterprise. It is made up of servers, workstations, shared resources, a network operating system and a communications link. These individual PCs and devices on a LAN are known as “nodes”, and are connected by cables to access data and devices anywhere on the LAN, so that many users can share expensive devices and data.

LBA *(Logical Block Addressing)*
Logical block addressing is a technique that allows a computer to address a hard disk larger than 528 megabytes. A logical block address is a 28-bit value that maps to a specific cylinder-head-sector address on the disk. 28 bits allows sufficient variation to specify addresses on a hard disk up to 8.4 gigabytes in data storage capacity. Logical block addressing is one of the defining features of Enhanced IDE (EIDE), a hard disk interface to the computer bus or data paths.

LED *(Light Emitting Diode)*
A semiconductor device that converts electrical energy into light. Since it lights up (usually red) when electricity is passed through it, it is usually used for the activity lights on computer's component, such as disk drivers.

LPT *(Line Printer Terminal)*
Logical device name for a line printer; a name reserved by the MS-DOS for up to three parallel printer ports: LPT1, LPT2, and LPT3. It is frequently used by the OS to identify a printer.

Overclocking
Overclocking is resetting your computer so that the microprocessor runs faster than the manufacturer-specified speed (for example, setting an Intel 166 MHz (megahertz) microprocessor to run at 200 Mhz).

PCI *(Peripheral Component Interconnect)*
A local bus standard developed by Intel that first appeared on PCs in late 1993. PCI provides "plug and play" capability and allows IRQs to be shared. The PCI controller can exchange data with the system's CPU either 32 bits or 64 bits at a time.

PnP *(Plug and Play)*
A set of specifications that allows a PC to configure itself automatically to work with peripherals. The user can "plug" in a peripheral device and "play" it without configuring the system manually. To implement this useful feature, both the BIOS that supports PnP and a PnP expansion card are required.

POST *(Power On Self Test)*
During booting up your system, the BIOS executes a series of diagnostic tests, include checking the RAM, the keyboard, the disk drives, etc., to see if they are properly connected and operating.

PS/2 Port
A type of port developed by IBM for connecting a mouse or keyboard to a PC. The PS/2 port supports a mini DIN plug containing just 6 pins. Most modern PCs equipped with PS/2 ports so that the special port can be used by another device, such as a modem.

RAID
RAID (Redundant Array of Independent Disks; originally Redundant Array of Inexpensive Disks) is a way of storing the same data in different places (thus, redundantly) on multiple hard disks. By placing data on multiple disks, I/O operations can overlap in a balanced way, improving performance. Since multiple disks increases the mean time between failure (MTBF), storing data redundantly also increases fault-tolerance.

SCSI
Acronym for Small Computer System Interface. Pronounced "scuzzy," SCSI is a parallel interface standard used by Apple Macintosh computers, PCs, and many UNIX systems for attaching peripheral devices to computers. SCSI interfaces provide for faster data transmission rates (up to 80 megabytes per second) than standard serial and parallel ports. In addition, you can attach many devices to a single SCSI port, so that SCSI is really an I/O bus rather than simply an interface.

USB *(Universal Serial Bus)*
A hardware interface for low-speed peripherals such as the keyboard, mouse, joystick, etc. USB provides a maximum bandwidth of 12 Mbit/sec (Mbps) for connecting up to 127 peripheral devices to PC. USB features hot swap capability and multiple data streams, allows external devices to be plugged in and unplugged without turning the system off.

Virus
A program or a piece of code that infects computer files by inserting in those files copies of itself. The virus code is buried within an existing program, and is activated when that program is executed. All the viruses are man-made, and often have damaging side effects.

WLAN
Acronym for wireless local-area network. Also referred to as LAWN. A type of local-area network that uses high-frequency radio waves rather than wires to communicate between nodes.